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Los Angeles

Contending with illness in ancient Egypt:

A textual and osteological study of health care at Deir el-Medina

A dissertation submitted in partial satisfaction of the requirements for the degree

Doctor of Philosophy in Archaeology

By

Anne Eliese Austin

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ABSTRACT OF THE DISSERTATION

**Contending with illness in ancient Egypt:
A textual and osteological study of health care at Deir el-Medina**

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Anne Eliese Austin

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Professor Willeke Wendrich, Chair

Archaeologists primarily address disease, illness, and health through biological studies of human remains. These studies convey physical suffering in the past, but without broader social context, they do not document how culture responds to illness. As a result, we lack explanations for the relationship between physiological health and social health care. To resolve this problem, it is necessary to develop a model for an archaeological investigation of health care that incorporates both biological and social factors to analyze not only how individuals died, but also what factors helped them to survive in the past.

This dissertation acts as a case study for an archaeology of health care through an investigation of the ancient Egyptian village of Deir el-Medina, the home of the workmen who built the royal tombs during the New Kingdom (1550 BCE-1080 BCE). I

use an interdisciplinary approach that combines texts from the site with osteological data from the villagers' skeletal remains in order to document both the major stresses on health at the site and Deir el-Medina's health care networks.

I accomplish this through a bioarchaeological analysis of health using the systemic stress model. Comparisons between Deir el-Medina and other sites in Egypt as well as broader sites in the Western Hemisphere Project show that health was relatively high at Deir el-Medina, but that infectious disease and occupational stress were primary factors impacting the villagers' health.

The villagers at Deir el-Medina utilized a complex health care system in order to respond to these stresses. The ancient Egyptian government provided rations for medical professionals and subsidized sick leave for the workmen. These medical professionals would have used a logic of contamination to explain the transmission of disease and treat illnesses. In conjunction with this, personal networks involving reciprocal caretaking between colleagues and close family members ensured the sick had provisions and nursing.

This research offers evidence for one of the world's oldest documented health care systems. It demonstrates how illnesses were perceived and treated in ancient Egypt, and finally, it offers a model for an archaeology of health care.

The dissertation of Anne Eliese Austin is approved.

Kathlyn M. Cooney

John K. Papadopoulos

Gail E. Kennedy

Jerome C. Rose

Willemina Z. Wendrich, Chair

University of California, Los Angeles

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BIOGRAPHICAL SKETCH

EDUCATION

- 2009 **UCLA, Los Angeles, CA**
M.A. in the Interdepartmental Program of Archaeology
- 2006 **Harvard University, Cambridge, MA**
B.A. with Honors in Anthropology

PUBLICATIONS

- Forthcoming “Accounting for sick days: a scalar approach to health and disease at Deir el-Medina,” *Journal of Near Eastern Studies*. (Accepted June 19, 2014)
- 2014 “Mobilizing Archaeologists: Increasing the Quantity and Quality of Data Collected in the Field with Mobile Technology,” *Advances in Archaeological Practice* (2) 1: 13-23. doi: 10.7183/2326-3768.2.1.13
- 2011 “Preliminary Remarks on the Coptic Burials at Karanis,” *Coptica* 10: 45-60.
- 2009 The (En)gendered Body During the Old Kingdom as a Product of Form, Use, and Display: A Bioarchaeological Analysis of Male and Female Body Display during the 5th and 6th Dynasties (Unpublished master’s thesis). UCLA, Los Angeles, CA.
- 2007 Makarewicz, C. & Austin, A. “Late PPNB Occupation at el-Hemmeh: Results from the Third Excavation Season,” *Neo-lithics* 2/06: 19-23.

CONFERENCE PAPERS AND PRESENTATIONS

- 2014 Simpson, B., A. Austin, and K. Simon. “Three-dimensional Recording of Architecture in Karanis, Egypt,” paper presented at the *Theoretical Archaeology Group USA Annual Meeting* in Urbana-Champaign, Illinois.
- 2014 “Textual and osteological indicators of illness in daily life at Deir el-Medina,” paper presented at the *American Research Center in Egypt Annual Meeting* in Portland, Oregon. ***Awarded best student paper**
- 2014 “Developing mobile-based digital forms for archaeological data collection,” paper to be presented at the *Society for American Archaeology Annual Conference* in Austin, Texas.
- 2013 “Increasing the quality of your bioarchaeological data through the use of tablet-based software,” poster presented at the *American Association of Physical Anthropologists Annual conference* in Knoxville, TN.
- 2013 Simpson, B., A. Austin, and K. Simon. “Analyzing Three Methods for Digital Preservation of Architectural Data at the Greco-Roman Site of Karanis,” paper

presented at the *Society for American Archaeology* Annual Conference, Honolulu, Hawaii.

- 2012 “From bread to porridge: an analysis of dietary shifts during Roman rule at Karanis, Egypt,” poster presented at the *American Association of Physical Anthropologists* Annual conference, Portland, OR.
- 2011 “Finding disability in modern and ancient Egypt,” paper presented at the *Theoretical Archaeology Group Annual Meeting*, Berkeley, CA.
- 2011 Austin, A., Simpson, B., Simon, K. “The Collection and Practical Application of Three-Dimensional Scan Data at the Greco-Roman Site of Karanis,” paper presented at the *39th Annual Conference of Computer Applications and Quantitative Methods in Archaeology*, Beijing, China.
- 2011 Austin, A., B. Simpson, and K. Simon. “The role of three-dimensional laser scanning in spatial analysis of the Greco-Roman site of Karanis,” paper presented at the *American Research Center in Egypt Annual Meeting*, Chicago, IL.
- 2011 “Health, disease, and occupational stress at Karanis,” poster presented at *The First Annual Archaeology Graduate Student Conference*, UCLA, Los Angeles, CA.
- 2010 “Sacred Skeletons Speak: Results of the 2008 and 2009 Karanis Cemetery Survey Field Seasons,” paper presented at the *St. Shenouda-UCLA Conference of Coptic Studies*, UCLA, Los Angeles, CA.
- 2010 “The Proportions of Gender in the Amarna Style: A Visual Continuum,” paper presented at the *American Research Center in Egypt Annual Meeting*, Berkeley, CA.

ACADEMIC EMPLOYMENT

- 2012-13 **Lecturer**, UCLA Extension, Los Angeles, CA
- 2012-13 **Summer Instructor**, Department of Near Eastern Languages and Cultures, UCLA, Los Angeles, CA
- 2011-12 **Instructional Technology Consultant**, Center for Digital Humanities, UCLA, Los Angeles, CA
- 2008-11 **Teaching Associate**, Department of Near Eastern Languages and Cultures, UCLA, Los Angeles, CA
- 2008-11 **Graduate Student Researcher**, Department of Near Eastern Languages and Cultures, UCLA, Los Angeles, CA

1 INTRODUCTION

1.1 RESEARCH PROBLEM

Archaeologists primarily address disease, illness, and health through biological studies of human remains. Such studies convey the universal corporeality of pain and illness, informing us about physical suffering in the past, but without broader social context, they are incapable of explaining how culture responds to illness. As a result, we often lack interpretations of the relationship between physiological health and social health care. To resolve this problem, it is necessary to develop an interdisciplinary model for studying health care that incorporates both biological and social factors to analyze not only how individuals died, but also what helped them to survive in the past.

In most contexts, this is no easy task. Artifacts documenting health care are often scarce or ambiguous, and even when they can be identified, they may not offer sufficient information to describe a health care system for an entire community. Individuals with extreme pathology, for example, can suggest the integration of the disabled into a society, but these unique cases cannot explain how a culture accommodated for short-term illness or temporary impairment. Research documenting different health patterns in an entire population may signal that individuals were experiencing more biological and social stress than their peers, but these do not show how health care responded to these stresses in order to improve overall health.

Yet access to health care is a contributing factor to survival that requires investigation if we want to understand the health patterns of a community. In 2009, a team of researchers from Harvard found that nearly 45,000 people die each year in the

United States due to a lack of health insurance, and that the hazard ratio for mortality among the uninsured was higher even after adjustments for race/ethnicity, income, education, health status, body mass index, exercise, smoking and alcohol use (Wilper et al. 2009). In essence, medicine and personal care are major contributing factors to survival that cannot be explained away by social context alone. Thus, the National Science Technology Council specifically called for more research from the social sciences to provide new evidence on the influence of personal and professional care networks on health status (2009, 15-16).

Archaeologists have unique access to information on health care in the past, and Egyptologists are particularly well-positioned to study past relationships between health and society owing to the myriad scholars who have examined the paleopathology of human remains in Egypt and medicine in the Egyptian textual record.¹ Yet even in Egyptology, much of the paleopathological literature is focused on royal mummies (Buikstra et al. 1993), giving us minimal insight into the vast majority of people. Recent bioarchaeological research on broader Egyptian populations at sites like Amarna (Rose and Zabecki 2009) and Tombos (Buzon 2004) have begun to correct these problems, yet paradoxically, individuals in these studies are not well-represented in the textual record. Consequently, we need a case study for the archaeology of health care that can address this noticeable gap in scholarship in both Egyptology and broader archaeology.

¹ The following are some of the most comprehensive publications on bioarchaeology, Egyptian medicine, and medical texts: Rose and colleagues (1996) and Sabbahy (2012) review the extensive paleopathological scholarship on Egyptian human remains; Halioua and colleagues (2005) and Nunn (1996) offer detailed discussions of Egyptian medicine, while Grapow and colleagues (1954-1973) and Bardinet (1995) provide nuanced translations of the primary medical papyri.

1.2 RESEARCH PURPOSE

This dissertation offers such a case study on health care through focusing on the intersection between morbidity patterns and health care networks at the Egyptian New Kingdom village of Deir el-Medina. The primary purpose of this dissertation is to determine the main health issues at Deir el-Medina and document how health care was structured as a response to illness at the site. In this research, I combine a traditional osteological approach with a textual analysis of letters, medical texts, and state documents. Through these data sets, I assess how the health care system at Deir el-Medina varied among individuals of different genders, statuses, and occupations. While osteological analyses allow me to document the physiological health histories of the Deir el-Medina population, textual sources inform me about the social mechanisms that structured health care to combat illness in the village.

As a case study, this interdisciplinary research offers a secure and independent model for an empirical investigation of health care in archaeological contexts. Using Wylie's criteria for valid archaeological inquiry (2002, 192), it utilizes both horizontal and vertical independence in observations to offer stable and autonomous data on health status and health care. The application of texts and human remains as two distinct data sets allows for horizontal independence as these different data sets establish separate lines of evidence to corroborate and/or complicate conclusions about health care and health status. The theoretical model employed in this dissertation secures its vertical independence. This model builds from observations on individual pieces of textual or osteological evidence up to broader communal trends. It takes advantage of natural links between osteological data and physiological health as

well as textual data and the experience and motivations behind health care to reconstruct health status and health care in an ancient community.

1.3 HISTORICAL CONTEXT AND SUITABILITY OF DEIR EL-MEDINA FOR A STUDY ON HEALTH

I chose Deir el-Medina as the focus for this study owing to its unique potential to answer questions about health care. Deir el-Medina, a UNESCO world heritage site, was the home of the workmen who built the royal tombs during the New Kingdom (1550-1080 B.C.E.). This archaeological site, excavated primarily in the 20th century by Bernard Bruyère as a mission of the Institut Français d'Archéologie Orientale, is unusual in Egypt as it consists of both the village and its surrounding necropoleis, giving us access to information from the human remains and from the settlement itself. During his excavations, Bruyère unearthed a giant pit including thousands of ostraca—limestone flakes or pottery fragments used for writing. These copious texts give us unusual access to daily life and make Deir el-Medina truly exceptional. As Snape summarizes, “the community of the ancient world about which we know the most is the village of Deir el-Medina” (2011, 233). While a review of all of the research on daily life at Deir el-Medina is beyond the scope of this introduction,² the following brief summary outlines how Deir el-Medina’s unique physical, socio-economic, and political place within broader Thebes makes it exceptionally suitable for a study on health care in the past.

² For a systematic bibliography of Deir el-Medina, see Demarée and colleagues (2012). For general overviews of Deir el-Medina, see Andreu (2002), Bierbrier (1982), Černý (1973), and Valbelle (1985).

The location of Deir el-Medina—situated in the western Theban hills among the mortuary temples and tombs of Egyptian royalty and the elite—gives us unusual access into the daily landscape negotiated by the villagers and their families. Ancient Thebes, modern day Luxor, was naturally divided into two sides by the Nile, with the vast majority of its denizens living on the Eastern bank. The opposing Western bank, and more specifically its limestone cliffs and valleys, was an unpopulated landscape of rock-cut tombs. Deir el-Medina’s location, in this relatively barren landscape, allows us to use the remnants of the villagers’ movements to reconstruct the exact areas where they would have travelled on a daily basis.

While we are unsure why the ancient Egyptian government chose the exact location for Deir el-Medina, we can say that it was placed far enough from the Valley of the Kings to warrant the construction of a smaller set of stone-built “huts” for temporary living during the work week.³ Numerous graffiti and artifacts distributed between the village and the huts have elucidated the path trekked by the residents of Deir el-Medina, and small shrines around the Theban hills have demarcated the areas the villagers once travelled. Topographical terminology also delimits the areas they visited, including references to local mortuary complexes, the Valley of the Queens, and the marketplace at the Nile river bank (*mry.t*).⁴ Modelling health at Deir el-Medina can consequently include the impact of movement to and from these locations, as well as the limitations these spaces would have placed on the unhealthy.

The unique socio-economic position of Deir el-Medina also gives us unusual access into health care. As this dissertation demonstrates, the actual labor required to cut and decorate a tomb took its toll on the villagers. Simultaneously, since the village

³ For more information about the workmen’s huts, see Dorn (2011).

⁴ For explanation of this term, see Cerný (1973, 94–95).

of Deir el-Medina was built by the Egyptian government for the workforce, it included many atypical amenities. The state provided the workmen and their families homes, food, water, service personnel, and even servants to assist with daily labor (Černý 1973). Consequently, though they were workers, they likely had unprecedented access to the spectrum of health care and medicine only reserved for the wealthy elite.

While the elevated status of the workmen created a bevy of opportunities for a complex health care system, the social differentiation within the workforce also allows us to consider how socio-economic status would have impacted access to care and medicine. Previous studies on the Deir el-Medina population (e.g., Černý 1973; Davies 1999; Janssen 1997) have already established a social hierarchy within the town through analysis of the titles and occupations of its residents. The workmen were divided into two sides, each being led by a foreman, and the entire crew was accounted for by a scribe.⁵ To support the workmen, there were also apprentices (*mnḥ*)⁶ and younger boys (*ms ḥr*)⁷ who could run errands for the workforce. These various positions were not only paid different wages, but the scribes and foremen were also given more important social roles in village politics. These highest officials in the workforce were likely part of the top two percent of the population (McDowell 1999, 7). Comparison of these different subdivisions within the workforce at Deir el-Medina can thus elucidate socio-economic differences in health care access.

Finally, the incredibly detailed textual record reflects how Deir el-Medina's position within Egyptian bureaucracy can give us unusually specific access into health and health care. As an extension of the office of the vizier, the administrators of Deir

⁵ This position was expanded in the 20th dynasty, so that there were two scribes overseeing the workforce (Janssen 1975, 461-2).

⁶ For discussion of this term, see Černý (1973, 113-115).

⁷ For discussion of this term, see Černý (1973, 117-119).

el-Medina were required to record a variety of administrative documents such as monthly ration distributions, absences from work, and the use of state supplies. These bureaucratic texts can tell us incredibly detailed information about health usually unavailable such as when a specific workman was sick, how much medical professionals were paid, and the amount of provisions given to specific members of the workforce.

1.4 SCOPE AND LIMITATIONS OF THIS STUDY

This dissertation includes over 1,000 data entries on human remains from Deir el-Medina's Theban tombs (TT) 6, 217, and 291. These tombs contain human remains dating from the 18th to the 21st dynasties (approximately 1550 to 1000 B.C.E.). This research is particularly informative as only a handful of mummies have been studied from Deir el-Medina.

This dissertation also references over 230 ancient Egyptian papyri and ostraca. These include absence from work records, personal letters referencing health and health care, as well as other categories of texts from the site that specifically address health care such as rations for medical professionals, legal investigations into treatment of the sick, and medical prescriptions. These texts span the 19th and 20th dynasties (1300-1080 B.C.E.).

The use of human remains and texts exclusively from the site of Deir el-Medina limits the evidence of this study to Egyptian culture during the New Kingdom. Further, the cultural implications of this study must be weighed carefully, as Deir el-Medina is a unique example of a highly literate and state-supported village placed literally on the edge of broader Egyptian society. Its uniqueness makes it both desirable for scholarship, owing to its ubiquitous texts, but also problematically exceptional. Thus,

while some aspects of this research can be extrapolated to broader Egyptian culture, such as an emic theory of disease transmission, other aspects like specific wages for medical professionals are impossible to disassociate from Deir el-Medina itself.

1.5 DISCIPLINARY CONTEXT AND RESEARCH SIGNIFICANCE

Contextualizing this project within current literature demonstrates its significant contribution to scholarship within both Egyptology and archaeology. First, this dissertation contributes to our understanding of Deir el-Medina by organizing, analyzing, and publishing both the human remains stored at the site and health-related texts to explore Deir el-Medina's health care system. Of those human remains which have been studied from the site, current literature only represents either a handful of individuals (Gonzalez y Arema 2004; Janot 2003) or intrusive burials from after the abandonment of the village (Dunand and Lichtenberg 2006, 172). This omission in bioarchaeological research on the extensive New Kingdom human remains at Deir el-Medina is glaring. As Sabbahy notes, "Considering the extensive archaeological and written material we have from this ancient site, the addition of the vast array of information that could be gathered with modern technology from their human remains, would be remarkable" (2010, 119). This dissertation is consequently the first publication of this assemblage of human remains, and adds valuable information about the physical experiences of the people of Deir el-Medina.

In many cases, it is evident how information from the human remains at Deir el-Medina could corroborate or expand existing scholarship on ancient Egypt. Other studies on women have been forced to either use bioarchaeological data from other sites to corroborate the texts (Toivari-Viitala 2001, 171) or use sparing, existing data on human remains for preliminary remarks about health and aging (Sweeney 2006).

This dissertation not only supplements these publications, but also adds to existing scholarship in clear ways by contributing bodies to studies of embodiment (Meskell 1999), paleopathology to studies on epidemiology (Miller 1991), and the demography of family burials to studies on genealogy (Bierbrier 1980; Davies 1999).

Furthermore, this research coheres existing publications on the textual evidence for social perceptions of health including absence from work records (Janssen 1980; Toivari-Viitala 2006), interpersonal letters discussing the physical well-being of others (McDowell 1999), ration documents (Janssen 1997), and the medical papyri (Grapow et al. 1954). Through combining the existing research with additional texts on health from Deir el-Medina, this dissertation provides a more holistic understanding of the health care system in place.

It also sheds light on the impact labor had on quality of life at Deir el-Medina. This site is one of the most fascinating and earliest glimpses in organized labor in the ancient world. Existing scholarship has already documented many different aspects of the role labor played in daily life at Deir el-Medina such as labor organization (Demarée 2010; Eyre 1987), its compensation (Černý 1954), and even the first recorded labor strike in global history (Espada 2001; Frandsen 1990). This dissertation layers onto these topics the physical impacts of labor on the workforce. It contributes to our understanding of their quality of life in reference to other workforces and to the elite in Thebes. It further documents how expectations for labor at Deir el-Medina actually impacted daily life. This research is reciprocal with previous studies as it allows us to understand how labor organization and compensation may have responded to health status. When contextualized within emic social perceptions of laborers, such as documented in the famous ancient Egyptian text the *Satire of the Trades* (Lichtheim

1976, 1:184-193), it enables us to further nuance the social position of the Deir el-Medina workforce.

This dissertation also contributes to research on Egyptian medicine and medical texts. This area of interest has attracted scholarship from both medical professionals interested in Egypt (e.g., Ghalioungui 1973; Halioua et al. 2005; Nunn 1996), Egyptologists interested in medicine (e.g., Bardinet 1995; Grapow et al. 1954; Quack 2003; Westendorf 1998), and Egyptologists focused on Egyptian magic (e.g., Borghouts 1978; Pinch 1995; Ritner 2008; Sørensen 1984).⁸ Despite this wealth of research on Egyptian medicine, unifying these approaches has been difficult. Professional physicians usually lack Egyptological training, and they often focus on diagnosing diseases from the medical texts which can lead to erroneous or circular arguments (see, for example, criticisms of Ebbell's translation discussed in Nunn 1996, 30-31). Egyptological research on medical texts are largely philological, making it difficult to extrapolate how these texts translated into physical practice in a broader community. The texts themselves complicate matters, as they are hard to contextualize; they are handbooks composed of numerous entries for treating illnesses, but in the majority of cases, their provenance is unknown (Nunn 1996, 24). Further, while these handbooks document a variety of disease treatments, there is a noticeable gap in cohesive studies on the basic theoretical principles behind Egyptian medicine (Fischer-Elfert 2009, 49). This dissertation contributes both a theory of disease transmission as well the contextualization of medical texts from their role in a broader health care system to their use in individual instances of illness.

⁸ The dichotomy between magic and medicine is a false one, but has been maintained in the field through the arbitrary bifurcation of these texts even though publications on both Egyptian magic and medicine have agreed that these categories are only modern constructions. To expand this discussion, I offer several logical arguments against separating them on page 78.

Moreover, this dissertation contributes the model of an ancient health care system to emerging scholarship on health care in bioarchaeology and archaeology. Current scholarship primarily focuses on individual instances of health care, usually of disabled individuals, in archaeological contexts (e.g., Cross 2007; Hawkey 1998; Hubert 2000). These studies address social exclusion and significantly extend the historical context of disability (Shakespeare 1999), but are focused on individuals with extreme pathologies. Bioarchaeological research also emphasizes models of care for the disabled in attempts to identify health care in archaeological contexts or even determine when health care can be inferred from human remains (Dettwyler 1991; Hawkey 1998; Tilley and Oxenham 2011; Tilley and Cameron 2014). These archaeological and bioarchaeological studies suggest discrete instances of survival through social mechanisms, but cannot indicate how these instances fit into a broader system of care founded upon differing cultural models of medicine and social care networks. Essentially, they document that care existed in the past, but not necessarily how it functioned or its impact on the health status of the broader population.

1.6 DISSERTATION ORGANIZATION

To determine how health care was structured as a response to illness at Deir el-Medina, I use the following research questions to guide this dissertation:

1. What were the main stresses on health for men and women at Deir el-Medina, and how did their health compare to analogous populations?
2. How were networks of health care at Deir el-Medina designed, structured, and maintained?

3. How did social identity impact the availability of different forms of care at the site?

Following this introduction, in chapter two I outline the theoretical framework employed in this dissertation to address these research questions. For this dissertation, I use the biopsychosocial model (Engel 1977) to access health in the human remains. This model is particularly useful as it is designed to integrate social context with biological health to explain health status. I also employ theoretical models of health care developed by Kleinman (1981) to identify how illnesses were diagnosed and treated at Deir el-Medina. These models allow me to delineate emic ideas about disease transmission and its treatment. They also create a structure from which to explain how multiple professional and private levels for care overlay and interact to constitute a health care network.

In chapter three, I begin assessing health care at Deir el-Medina by identifying the Egyptian theory of disease transmission. Through the *Oracular Amuletic Decrees* and through medical texts, I demonstrate that the Egyptian theory of disease transmission was based on a concept of contamination, and consequently medical care responded to contaminants by attempting to remove them and block them from (re-)entering the body. I then use specific texts from Deir el-Medina to explore how wealth and literacy both expanded and limited access to this medical knowledge.

Chapter four continues reconstructing health care through identifying the health care practitioners at the site and their roles in the health care process. I specifically document texts pertaining to the *swnw* (physician), *hrp-Srk.t* (scorpion charmer), and *rḥ.t* (wise woman) to understand how each of these positions fit into a public and private health care system. I then explore the caretakers documented in the

personal letters and legal documents at the site, including cases of both care and neglect. The latter are used to demonstrate how underlying fiscal and social pressures motivated the villagers to take care of each other. I specifically identify ways occupational titles and social status could have directly impacted the health care networks available to individuals in the village.

In chapter five, I examine how the absence from work texts inform us about disease and illness in the village. I specifically analyze these texts to determine seasonal patterns of illness, expectations for labor, and the impact of contagious disease on tomb progress. I demonstrate that infectious diseases likely dominated health issues at Deir el-Medina, creating a seasonal morbidity pattern that rises in the spring and falls in the autumn.

These data from texts at Deir el-Medina then lead fluidly to the second half of my dissertation, which focuses on osteological information gleaned from the human remains stored at the site. In chapter six, I outline the osteological materials and methods employed in this dissertation. I quantify health in the human remains using systemic stress models as outlined in the Western Hemisphere Project (Steckel and Rose 2002) and layer this with qualitative descriptions of pathological elements from Deir el-Medina to understand how physical impairments could have created limitations in social status and activity at the site.

I then describe the majority of osteological data and results in chapter seven. I specifically evaluate significant differences in health between males and females, and find that males consistently would have experienced more stress at Deir el-Medina. I add to this quantitative analysis a qualitative study of pathological elements identified at Deir el-Medina in order to identify individuals with impairments, and to assess how these could have limited an individual's social and physical participation in village life.

In chapter eight, I give the health data context by comparing health status at Deir el-Medina with other sites inside and outside of Egypt. Specifically, I use analogous groups of working and elite populations from the Old Kingdom and New Kingdom in order to determine, relatively, how good health status was at Deir el-Medina. Additionally, I compare health status data from Deir el-Medina with the much larger Western Hemisphere Project. This data set, with 65 sites and over 12,000 individuals, offers a means to assess how Deir el-Medina health patterns fit into an international history of health.

In chapter nine, the conclusion, I return to these three central research questions. I combine research on the texts and the human remains to discuss the main illnesses impacting health at Deir el-Medina, and then go on to demonstrate how the health care system was structured to treat these illnesses. I conclude by discussing how this dissertation has the potential to contribute to future discussions of health and disease within Egyptology. Finally, I broaden the scope of the conclusions to address the implications this work has for an archaeology of health care.

1.7 NOTES ON TRANSLATION

All translations and transliterations are provided by myself, unless otherwise noted. The transliterations provided use the transliteration font created by *Glyph for Windows* and presently available online at <http://www.yare.org/egypt/fonts.htm>. Proper names are transliterated throughout the text, while common Egyptian concepts (e.g., maat) are written using standard spelling in Egyptological publications. I created all hieroglyphs in this dissertation using the JSesh Hieroglyphic Editor 6.4.1. When referring to individual signs (e.g., A1 for the seated man), I use the classification of hieroglyphs designated by Gardiner (1957).

In transliterations and translations, I use square brackets “[]” to indicate missing text that has been amended and square brackets with an accompanying ellipses “[...]” to indicate breaks in the text. I use parentheses “()” whenever additional words employed in the translation are necessary to render the text in English, even though these words do not need to be present in the original text. Finally, I use curly brackets “{ }” when I have added corrections to the text because I have assumed an accidental omission or grammatical mistake by the original author.

The majority of translations are based on published hieroglyphic transcriptions. Medical texts are published in hieroglyphic transcription in the *Grundriss der Medizin der alten Ägypter* (Grapow et al. 1958). These include Papyrus Ebers, Papyrus Edwin Smith, and Papyrus Berlin 3038. Ostraca and papyri from Deir el-Medina are mostly published in Kitchen’s *Ramesside Inscriptions* (1969-1990), hereafter referred to as KRI, and Černý’s *Late Ramesside Letters* (1939), hereafter referred to as LRL. These are referred to in the text using the original line numbers as well as page numbers for published transcriptions. For readers interested in alternative translations, the first six volumes of KRI are also published in English translation (Kitchen 1993-2012) as are the LRL (Wente 1967).

Definitions are based on database entries in the extensive *Thesaurus Linguae Aegyptiae* (TLA; Hafemann et al. 2012), which includes definitions provided in the multi-volume dictionary of Egyptian language (Wb; Erman and Grapow 1926-1961), the medical dictionary (MedWb; Grapow et al. 1961), the pharmacological dictionary (DrogWb; Deines and Grapow 1959), and the Late Egyptian dictionary (Lesko; Lesko and Lesko 1982). Footnotes for definitions include references to these volumes where applicable along with the TLA lemma number, which links all of these definitions to one online database entry.

The texts are primarily referred to by their museum accession number, though in some cases this is also accompanied by the number assigned to them in the *Grundriss der Medizin der alten Ägypter* or in LRL. If writing is on both sides, the line numbers provided indicate the recto or verso as designated in the text's original publication. When multiple columns exist as well, the line number includes both the column and line (e.g., 5.13 is column five, line 13). Texts from Deir el-Medina are usually written on either ostraca or papyri. In this dissertation, this difference is denoted in the accession number as "O." for ostrakon (e.g., O. BM 5634) or "P." for papyrus (e.g., P. Edwin Smith). I provide an index of texts used in this dissertation in Appendix A.

2 A THEORETICAL FRAMEWORK FOR ACCESSING HEALTH IN THE PAST

Even today, defining health and delineating differences in health status is a debated and difficult task. This is even more complex when we attempt to define health and health status in the past where our resources are both limited and inconsistent. So how do theoretical models for studies on modern health both inhibit and expand ways we can discuss and identify health status and health care in the past?

In order to answer this question, I begin this chapter with discussion of modern definitions of health and disease, including an overview of biopsychosocial theory, the theoretical model utilized by the World Health Organization. I then integrate anthropological theoretical models of diagnosis and treatment to illustrate broader theoretical approaches to studying health care.

I demonstrate how these theories can be applied to archaeological studies, with specific attention to how anthropological theoretical approaches to identity and embodiment allow for a more nuanced understanding of health in archaeological materials. I then link these theoretical approaches with bioarchaeological models to demonstrate how we can identify differences in health in human remains. Finally, I combine these models to develop an overall theoretical framework employed in this dissertation to bridge health status and health care with the material record at Deir el-Medina.

2.1 DEFINING HEALTH

The World Health Organization has maintained the same definition for health since the organization was founded over 60 years ago: “Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” (World Health Organization 1948, 100). To understand the meaning behind this definition more clearly, it is first necessary to contextualize it within broader ideas concerning health and medicine. The WHO definition was made in 1948 as a reaction to the dominant biomedical model⁹ of disease (Larson 1999). This biomedical model “holds that even the most complex illness phenomena can be reduced to certain measurable physical abnormalities” (DiMatteo 1991, 124). Even in the 19th century, this model was challenged by physicians who focused on understanding the social, cultural, and biological context of a patient in their treatment. Hermann Nothnagel, professor of medicine at Vienna from 1883 until his death in 1905, viewed illness as a result of circumstances in which one must focus on “treating sick people and not diseases” (Porter 1998, 682). For the first half of the 20th century, there was a movement to broaden medical treatment to include this more holistic approach, giving rise to this definition of health when the World Health Organization came into existence.

In the following decades, the WHO definition was criticized for its broadness and its potential to make almost any social problem a medical one (Callahan 1973). Further, this definition does not actually address how to determine health status—one’s relative health when placed on a spectrum of the many possibilities between

⁹ The definition of the biomedical model itself is often made by scholars actually contradicting it through the use of the biopsychosocial model (White 2005, 12-18).

perfect health and death. There are no clear ways to measure such a broad definition nor a baseline from which to begin estimating a person's well-being.

2.2 THEORETICAL MODELS OF HEALTH AND HEALTH CARE

Though the WHO definition of health reflected a reaction to the biomedical model, in itself, it did not define or replace the biomedical model because it did not offer any specific means to qualify and quantify health. This was a problem, particularly in psychiatry, where medical professionals were attempting to integrate an individual's social, mental, and biological factors into a unified model for treatment.

In 1977, George Engel published a landmark article on his “biopsychosocial model,” which was designed to combine these three factors into separate yet overlying layers (1977).¹⁰ Engel states that even though fully measuring these variables is complex, such measurements are theoretically possible through considering multiple systemic layers affecting illness and health. In this sense, it is a systems theory approach to medicine that was influenced by the broader development of systems theory in the second half of the 20th century by scholars such as Weiss (1969) and von Bertalanffy (1973).

This model evolved in the following decades and was incorporated by the World Health Organization into its theoretical framework for the International Classification of Impairment, Disability, and Handicap (2012). In this version of the biopsychosocial model, there are five mutually exclusive layers of interactions between an individual and their body, culture, and environment:¹¹

¹⁰ For further discussion on the role of Engel in developing and disseminating the biopsychosocial model, see White (2005, 3-6).

¹¹ These layers are most frequently discussed in detail in disability studies. For example, see Albrecht, Seelman, and Bury (2001).

1. Physiological abnormality or losses: Physiological manifestations of disease or trauma
2. Impairment: Functional limitations caused by the physiological abnormality or losses
3. Activity limitation: Activities an individual can no longer complete due to their impairment
4. Participation limitation: Societal expectations which inhibit an individual with specific physiological abnormality or losses from participating
5. Contextual factors: The surrounding context of an individual which forms their social identity and cultural perceptions

Taken together, these five components identify and explain how physicality, society, and the individual intersect to create a broader identity related to health status. This model is advantageous because it treats these layers as separate yet overlying elements, allowing a study of health in an archaeological context to consider multiple avenues of evidence independently and yet layer them simultaneously to consider general ways these can interact and impact health status.

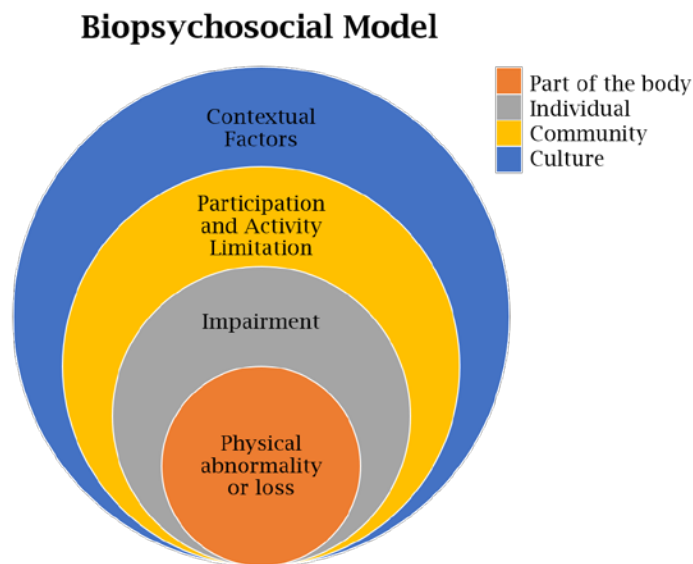


Figure 2.1 Layers of the Biopsychosocial Model

Using tuberculoid leprosy as an example, we can think of these layers as interacting on four levels (Figure 2.1). First, at its smallest level, one or more pathological lesions form, primarily as nerve lesions at the extremities (Aufderheide et

al. 1998, 146). These cause nerve damage, and at the level of the individual, they create an impairment with a loss or reduction of fine motor skills. When that individual then tries to interact with their community and space, they are limited both through cultural activities that require fine motor skills and through societal stigma surrounding leprosy. Finally, when we place this individual within the context of broader cultural tradition, their social status and identity dictate the opportunities and treatment they can receive with this condition.

Through this example, we can see how this model requires we analyze the relationship between health and the body, as well as between health and place, as discussed by Dyck and Fletcher (2010). The term place, in this context, is used to denote a physical space that an individual experiences, such as a home, daily route, and/or workplace. This physical space also embodies a community space embedded with social values, such as local cultural ideas about disease, social access to food, or practices of medical care. Place, then, can directly influence an individual's health through both their interaction with the landscape and through their social context. This also means that through analysis of both a community's space within a landscape and within society, it is possible to access this layer of the biopsychosocial model.

Scholarship in medical anthropology can also elucidate this relationship between health and the body through defining terms describing negative impacts on health. Medical anthropology differentiates between the terms disease, illness, and sickness: "While 'disease' refers to the medical or pathological source of a problem, 'illness' generally refers to the individual experience of being ill... In anthropological jargon, the term 'sickness' can be used to draw attention to the social-structural causes

of unwellness” (Sobo and Loustaunau 2010, xv).¹² These definitions structure a person’s health state into its biological, phenomenological, and socio-cultural aspects respectively, just as the biopsychosocial model structures health into its five layers.

While disease is represented most directly by observations on physiological abnormalities or losses, illness is parallel to impairments and activity limitations. Sickness, then, embodies both the participation limitations and contextual factors that affect and are affected by an individual’s socio-cultural position. Thus, the biopsychosocial model, when combined with terminology from medical anthropology, allows us to define both health and the myriad ways it can be negatively impacted.

2.3 MODELS OF HEALTH CARE

The biopsychosocial model is designed to enable more effective treatments for illness and definitions for health, but it is situated at the level of the individual. Broadening this to the population level involves identifying a culture’s health care network to understand cultural responses to negative impacts on health. Kleinman (1981, 50) has suggested that a culture’s health care network consists of three overlapping sectors: popular, professional, and folk care. Popular health care is non-professional, non-specialist care. It does not require payment, and the principles used for healing are based on the basic popular notions of disease and the body. Professional care consists of professionals within a culture with specific training and cultural sanction as healers. They usually have access to knowledge with more detailed explanations of disease mechanisms. Folk care is placed somewhere in-between these

¹² These definitions vary in exact wording throughout the discipline, though differing definitions still maintain the distinction of disease as biological, illness as phenomenological, and sickness as cultural (McElroy and Townsend 2008, 49; Young 1982).

two sectors, as these practitioners are usually specialists, but may not have formalized training as healers. While differentiating folk and professional sectors runs the risk of privileging Western biological definitions of medical practices as professional over culturally-relative practices as folk, it still can be usefully applied in situations where positions that are not primarily medical include skills that can be employed in the healing process.

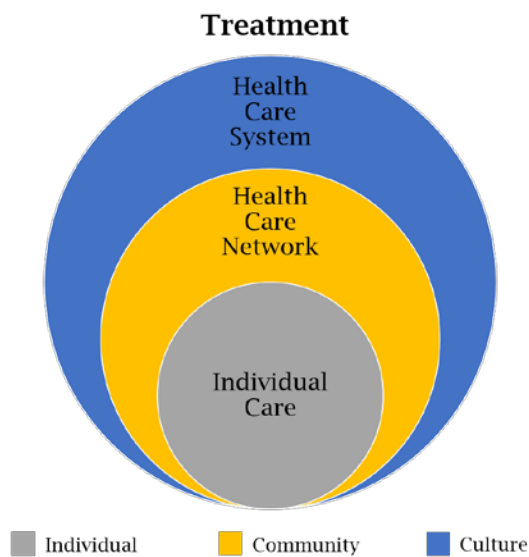


Figure 2.2 Layers of Health Care Treatment

In order to study a health care network successfully, one must explore how each of these aspects of individual care are structured, restricted, and overlap. The health care network represents the relationship between this individual care and community practices (Figure 2.2). Consequently, changes in the social context of the individual will also change the available health care network. In the United States, for example, different rules regarding insurance companies and payments for services restrict which professionals or treatments are accessible depending on a person's employer, wealth, and location. A health care system, then, constitutes the combined resources of

these many and varied health care networks including all potential professional, popular, and folk providers.

An additional component to studying a culture's health care network is identifying cultural explanations for the causes and treatments of disease. Kleinman approaches this through constructing explanatory models. An explanatory model is "the notions about an episode of sickness and its treatment that are employed by all those engaged in the clinical process" (Kleinman 1981, 105). In his research, Kleinman focused on determining how patients identified what caused the illness, why the illness started, how it affects the body, its severity, anticipated treatment, the results of treatment, and its socio-cultural impacts. Essentially, an explanatory model identifies an individual's perceptions of the mechanisms behind the illness as well as the physical and social limitations it imposes. On a broader level, the explanatory model then serves to explain and delineate disease, illness, and sickness by exploring the underlying explanations within a culture behind individual instances causing illness.¹³ These theories are used to explain how an individual is affected by illness, why an individual was sick, and what is responsible for disease. When a series of explanatory models for individuals all utilize the same underlying logic of the community, they can be used to define a theory of disease transmission (*Figure 2.3*).

¹³ For broader discussion on illness causation, see Helman (2007, 134-141).

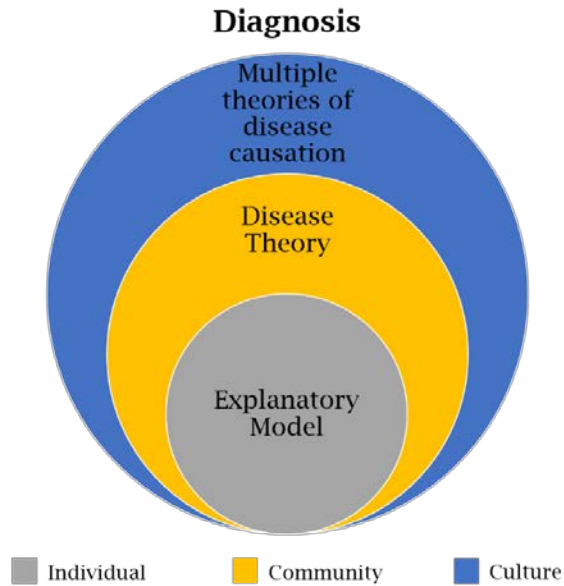


Figure 2.3 Layers of Health Care Diagnosis

Whereas the explanatory model is designed to describe *individual* instances of illness, a theory of disease transmission is the *cultural* explanation behind the spread of a specific illness.¹⁴ Disease theories are based on a logic of cause and effect, in which specific entities can be identified as causing the transmission of disease and creating illness. These causative disease agents¹⁵ can be both the source and the substance of disease. Treatments based on a particular disease theory must identify and react to these disease agents. For example, in the United States we use germ theory to explain the spread of infectious diseases. Treatments focus on identifying the specific germ causing a disease, destroying it, and preventing it from contaminating others. This partially replaced alternative disease theories such as humoral theory,

¹⁴ For an introduction to different theories of disease transmission, see Albrecht et al. (2000) and Lawrence and Wujastyk (2000).

¹⁵ The term “agent” in disease transmission has most frequently been used in epidemiology (Brown and Inhorn 2003, 177), though epidemiologists are moving away from identifying agents as more frequently diseases manifest through a combination of multiple factors. Nonetheless, this term is useful anthropologically as the objective is to use emic explanatory models which may still use single causative agents to explain disease processes.

which posited that disease results from an imbalance in a person's bodily fluids, each fluid being closely correlated to different aspects of temperature and humidity. Vestiges of humoral theory can still be seen today; someone who is excessively angry, for example, can be described as 'hot-blooded' (Geeraerts and Grondelaers 1995, 164). Consequently, while a culture may have one dominant theory of disease transmission, it can still utilize alternative, overlapping theories simultaneously. Similar to health care networks, it is only through cohesive combination of community disease theories that one can define broader cultural ideas about illness causation.

2.4 IDENTIFYING HEALTH AND HEALTH CARE IN ARCHAEOLOGY

In order to study health and health care in archaeology, one must link static archaeological remains to dynamic cultural processes related to both the diagnosis of biological diseases and identification of treatments for illness. The most useful resource in archaeology for this is the human body as "the power and value of the body to the investigation of human history is precisely because it is the nexus between biology and culture" (Sofaer 2006, 9). Identity and embodiment theories are complementary approaches used in bioarchaeology to explain how the body found in archaeological contexts—the archaeological body— can translate into these dynamic cultural processes, and are particularly useful for exploring health and health care in the past.

The growth of the application of bioarchaeology to the study of identities has been extremely fruitful when considering topics such as body modification, isotopic analysis, and of course health patterning (Knudson and Stojanowski 2008). The general trend in considering identity theory in conjunction with bioarchaeology has been

termed “social bioarchaeology” and can address issues related to identity in three vital ways (Agarwal and Glencross 2011):

1. Social bioarchaeology can assess cultural, political, and environmental effects on the body
2. It can uniquely identify diseases, food pathways, and trauma to individuals
3. It contextualizes these individuals within their broader populations in order to understand lived social processes

In this last point, it becomes clear that when bioarchaeology searches to understand lived social processes, it really acts as a bridge between the archaeological record and identity theory. While physiological health status may be a direct identity itself (e.g., an individual with leprosy would carry the identity of a leper), it also acts as an important indirect reflection of identity through habitual physical actions. Specifically, it shows how the premises set forth in Bourdieu’s theory of practice (1977), which has been deeply influential in the development of identity theory in archaeology, are inscribed on the body.¹⁶ The theory of practice approaches identities as constructions made from a series of behaviors reiterated thus reifying and communicating an identity within a set of principles formed from the broader community. As an individual repeats certain actions throughout a lifetime, they leave these practices in the bioarchaeological record through different health patterns in the skeleton such as fracture patterns from specific activities (e.g., Lovejoy and Heiple 1981), isotopic patterns in dentition evidencing movement between different regions (e.g., Bentley 2006), or patterns of osteoarthritis in different joints continuously used during occupation (e.g., Jurmain 1999). It is with these physiological markers in mind that we can use Bourdieu’s theory of practice to combine bioarchaeology with studies of identity.

¹⁶ For further discussion, see Jones (1997) and Meskell (2007).

Recent embodiment theory also uses the theory of practice to explain lived experiences as displayed on and through the body (Joyce 2005). In some cases, health—or more accurately illness—is embodied by disease processes which leave permanent lesions and morphological changes in the skeleton. These lesions do not only help us to understand how social status can impact illness, as in identity theory, but also how illness was experienced in the past. Thus, the body serves as the ideal place from which one can analyze the social, psychological, and biological layers of health in the ancient world.

2.5 IDENTIFYING HEALTH IN BIOARCHAEOLOGY

So far, my discussion has defined concepts surrounding health and health care, but it has yet to resolve one of the central issues with the biopsychosocial model: how can we quantifiably measure health in a way that also recognizes the variety of ways health can be impacted biologically, socially, and psychologically? What can we measure that simultaneously represents these overlapping negative impacts on health?

Concurrent with the development of new definitions of health in the early 20th century, there was also a growth in models of stress. One of the most influential books to define stress was Selye's *The Stress of Life* (1956). In this work, Selye notes that his interest in stress grew out of the need to understand the consistent pattern in which the body responds to a multitude of diseases. Inflammation, for example, is part of a patterned response to disease, but on its own is a non-specific indicator—it can occur in a variety of different ailments. To characterize this, Selye models stress and the way our bodies respond to it through the General Adaptation Syndrome (G.A.S.). Selye defines stress as, “the sum of all the non-specific effects of factors (normal activity, disease-producers, drugs, etc.), which can act upon the body. These agents themselves

are called stressors, when we refer to their ability to produce stress” (1956, 42). The General Adaptation Syndrome, then, is the specific patterned ways the body responds to the sum effects of these stressors. This stress model is advantageous as it explains how the body physiologically responds to stress, but it does not completely explain how social factors can act as stressors.

A variety of scholars addressed social factors through both more holistic theoretical stress models (e.g., Wolff 1953) and quantitative studies on the importance of cultural stressors (e.g., Spradley and Phillips 1972). Moss (1973) demonstrated how social communication networks can introduce psychological and social stressors that can cause measurable negative physiological impacts; simultaneously, these communication networks can also supply therapies to increase physiological immunity and relief. Essentially, Moss’s research makes it clear that stress models not only offer a means to explain the mechanisms in the body responding to these different stressors, but also suggests that quantifying stress allows us to evaluate and compare the multiple layers of biological, social, and psychological health between individuals. It thus creates a bridge between theoretical definitions of health in the biopsychosocial model and measurements of health in stress models.

2.6 HEALTH AND THE SYSTEMIC STRESS MODEL IN BIOARCHAEOLOGY

Developments in bioarchaeology during the 20th century allowed the discipline to adapt stress models for analysis of health patterns within and across ancient populations. While population-based studies of health status in the past began with Hooton (1930), who assessed epidemiological patterns in the burials at Pecos Pueblo, the broader application of such research as a field of interest arguably did not begin until the influence of processualism on the “New Archaeology” movement of the 1960s

(Cook and Powell 2006, 313). At this time, multiple publications in *Science* on paleopathology (Angel 1966; Armelagos 1969; Jarcho 1965; Kerley and Bass 1967) made the study of disease in antiquity accessible to a public scientific audience. Among these, Armelagos (1969) research on diachronic Nubian health patterns exemplified how population-studies of health status make it possible to compare relative health across different cultural groups.

This period coincided with the development of stress models and the biopsychosocial model; in each case, scholars expanded their models to allow for interdisciplinary research on health in the body. The modern definition of bioarchaeology exemplifies a similar shift toward more interdisciplinary and scientific research in the study of health in ancient human remains. The first application of the term “bioarchaeology” to the study of human remains in archaeological contexts was made by Buikstra (1977, 67)¹⁷ as part of a larger conference volume (Blakely 1977a) that focused on the ways bioarchaeologists can study human remains to explore social issues. In this volume, Blakely emphasizes the use of interdisciplinary approaches, and argued that biological anthropologists can contribute to illustrating “the interrelationships between the biological, cultural, and environmental variables that affect the adaptedness or maladaptedness of prehistoric populations” (Blakely 1977b, 3). Essentially, this volume represented a broader emphasis in bioarchaeology to unify studies on biology and culture, a “biocultural approach,” which made bioarchaeology particularly well-suited to theoretically address health as a product of society.

Methodologically, the field also developed in the 1960s and 1970s, with a growth in studies on ways non-specific stress manifests in human remains (e.g., Angel

¹⁷ Clark (1972) first used this term within the context of zooarchaeology, though today in the United States, scholars primarily use Buikstra’s definition.

1966; Armelagos et al. 1972; Sweeney et al. 1969). These methods provided the foundations for a broader analysis of generalized stress in bioarchaeology, which was crystalized at a much grander scale in the conference volume *Paleopathology at the Origins of Agriculture* (Cohen and Armelagos 1984). In this volume, the “systemic stress model” was formalized by Goodman and colleagues (1984). Since then, this model has been adapted and most prominently utilized at an international scale in *The Backbone of History* (Steckel and Rose 2002), a comprehensive diachronic study on health in the Western Hemisphere. Stemming from this project, the Global History of Health Project offers a complementary European module on health data from prehistory to the modern era (Steckel 2003). In each case, multiple non-specific markers (e.g., stature, degenerative joint disease, and linear enamel hypoplasias) are used to identify and quantify stress in human remains.¹⁸

In this model, stress is defined as “a measurable physiological disruption or perturbation that has consequence for individuals and populations” (Goodman and Martin 2002, 12). It is thus inversely correlated to health status, where higher health status is affiliated with lower amounts of stress. By modelling these kinds of systemic stress, it is possible to assess the overall stress an individual experienced rather than looking for the specific etiologies of individual diseases. This is advantageous as it (1) does not require correct identification of specific diseases in order to assess health status, (2) considers the multiple and compounding effects of more than one stress on an individual, and (3) allows consideration of the many illnesses which do not result in diagnostic skeletal lesions. In essence, the systemic stress model is a perfect metric for

¹⁸ Non-specific stress markers are described in more detail in chapter six.

health in this dissertation because it is designed to measure overall health through cumulative biological, psychological, and social stress experienced in a lifetime.

The general stress model aims to document the relationship between culture and biological health in several ways. First, it demonstrates the underlying effects of culture on biological health as “the severity and duration of the stress response may be viewed as a function of the degree of cultural and environmental constraints and stresses, balanced against the adequacy of the cultural buffering system and individual resistance resources” (Goodman and Martin 2002, 18). Cultural buffering systems are designed to reduce the amount of biological stress an individual experiences, such as clothing designed to minimize stress from the local climate. I suggest that health care networks within a culture are a complex form of a buffering system, designed to respond to stress in order to mollify and reduce it. Consequently, the health status of an individual not only reflects the amount of stress they experienced, but the efficacy of these cultural buffering systems and health care networks in alleviating stress.

Second, the general stress model can reveal culturally relevant trends affecting health status. It can assess whether some cultural groups experienced significantly more stress than others, and consequently highlight differences in the availability and efficacy of these cultural buffering systems.

Finally, the general stress model allows us to assess some basic differences in the primary sources of stress between disease, nutrition, and occupation. Some markers, such as linear enamel hypoplasias, are associated with early childhood illness (Goodman and Martin 2002, 23), while others, such as degenerative joint disease, are characteristic of adult behavioral stress. These differences further help to explain overall differences in health status within a population by differentiating the amount of stress experienced as children and adults.

2.7 LINKING BIOLOGICAL AND SOCIAL MODELS OF HEALTH AT DEIR EL-MEDINA

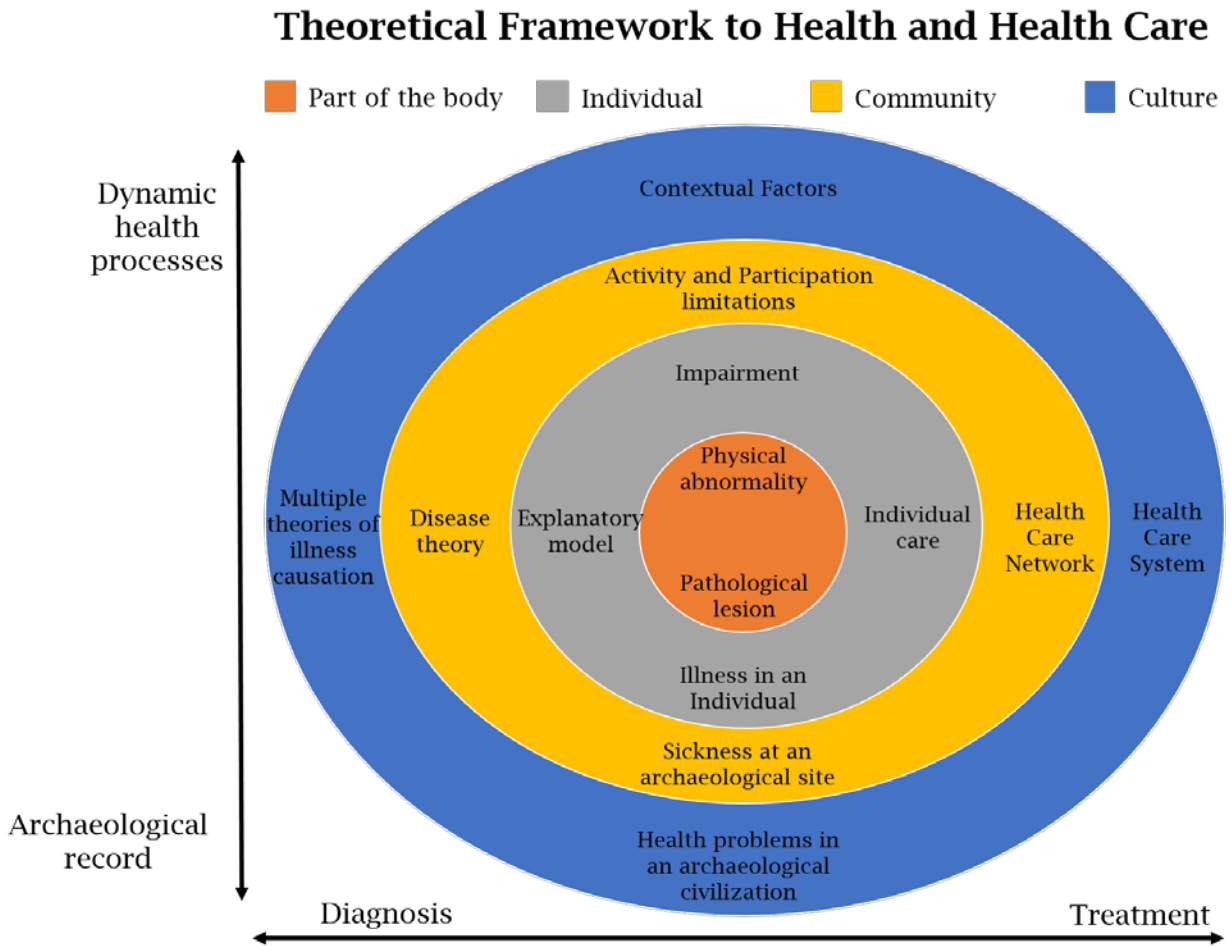


Figure 2.4 A theoretical framework for health and health care at Deir el-Medina

The theoretical framework used in this dissertation combines the theoretical approaches described in this chapter to access health and health care, as visualized in Figure 2.4. This framework is built on two axes. The vertical axis focuses on how the biopsychosocial model can link the body with health within society. The horizontal axis focuses on how theoretical models within anthropology describe health care as processes of diagnosis and treatment. The texts and human remains at Deir el-Medina

are specifically well-situated within this framework to access health status and health care at Deir el-Medina.

The texts give us insight into the horizontal axis starting at the level of the individual. At this level, individual descriptions of illness and treatment serve as the basis for explanatory models of disease. When these are combined in comprehensive medical texts, they create a disease theory (chapter three). The disease of an individual can be treated through a network of popular, professional, and folk practitioners. Texts discussing taking care of others through provisioning and nursing (popular health care), as well as texts describing the activities of medical practitioners (professional and folk health care), define how these different sectors of health care overlap and interact (chapter four).

Texts can even give us access into the vertical axis of Figure 2.4, which delineates the many variants of health, disease, illness, and sickness. Sick days recorded in absence from work texts provide specific, individual days of illness. I can evaluate them within the context of the physical and social place of the broader community to explain how sickness impacted the workforce (chapter five).

It is also on the vertical axis that the human body gives us unique insight into health, beginning with a pathological lesion as a direct manifestation of disease. Through identifying these lesions as either diagnostic indicators of pathology or non-specific stress indicators (chapter six), I can determine physical abnormalities in the body. At the level of an individual, these metrics can be used to quantify illness (chapter seven), which in turn delimits impairment. At the community level, these quantifications can then be compared both within Egypt and to broader populations in order to situate sickness at Deir el-Medina within a comprehensive cultural landscape (chapter eight). When these different data sets are combined, they create a rich

illustration of the ways biology and culture interact to impact both health status and health care at Deir el-Medina (chapter nine).

3 THE ANCIENT EGYPTIAN MEDICAL SYSTEM

3.1 INTRODUCTION

To begin analyzing health care at Deir el-Medina, I first focus on three principal components to the health care system: the theory of disease transmission, the system of diagnosis, and the mechanisms for treatment (Foster 1976). This system allows us to define medicine as anything designed to treat illness, and thus can include both proactive and reactive treatments. In this chapter, I explore emic perceptions of illnesses at Deir el-Medina as evidenced through texts from the village itself and broader medical texts which explicate concepts surrounding illness and health care in Egypt during the New Kingdom and Third Intermediate Period.

This chapter begins with an analysis of the Egyptian theory of disease transmission as evidenced in the *Oracular Amuletic Decrees* and medical texts. The former can be used to explain the agency of illness in Egypt—who or what caused illness and why. The latter, which were written as manuals for diagnosing and treating illnesses, offers information on how individuals became ill through explaining the modes of transmission, interaction, and eradication of disease.

Through a combined analysis of these texts, I demonstrate that the dominant theory of disease transmission in Egypt was founded upon a concept of contamination, whereby the body could be contaminated by a variety of agents, ranging from infection by divine semen to the internal corruption of the body itself.

I then use medical texts to demonstrate that contamination theory dictated logical arguments used in medical treatments, whereby medicine was designed to

remove contaminants from the body through purging, purification, and ritual sealing to prevent re-contamination.

Finally, I present texts from Deir el-Medina specifically relating to medical prescriptions and treatment to evidence how medicine was practiced in daily life. By contextualizing medicine to its use at Deir el-Medina, I demonstrate that medical archives were developed in discrete increments, and likely reflected the specific needs of a family or community, rather than being built as a generic compendium. Through analysis of amuletic medical texts, I demonstrate that because medical care was aimed at decontaminating individuals, treatments were specialized to cure one illness in one individual. This highly personalized medical care meant that when these treatments were not provided by the state, they would have been almost exclusively accessible to the literate. Moreover, the careful maintenance of these texts in combination with the use of esoteric and specialized language restricted broader medical archives to the most knowledgeable and literate members of a community.

3.2 PREVIOUS RESEARCH ON EGYPTIAN THEORIES OF DISEASE TRANSMISSION

Reconstructing theories of disease transmission from Egyptian texts is fraught with difficulty. As Lang notes in her discussion of Pharaonic medicine,¹⁹ “Explicit references to physiological and pathological ideas are present but rare, and theory is not discussed in detail in any extant work. Many of the terms used—whether for disease, disease causes, bodily organs, symptoms, or ingredient in remedies—do not occur outside the medical texts and are of uncertain and possibly multiple meanings

¹⁹ While Lang’s book is focused on Ptolemaic medicine, she includes extensive sections on Pharaonic medicine. All references to Lang in this dissertation are from these sections of her publication.

that depended heavily on contextual understanding, one that we have great difficulty recovering” (2013, 103). While an overarching theory of disease transmission is still noticeably absent in current research (as noted by Fischer-Elfert 2009, 49; and Quack 2003), specific studies have begun to explore Egyptian perceptions of the body, disease, and medicine. For example, individual articles have informed us about Egyptian ideas regarding airborne infection from demons (Engelmann and Hallof 1996), internal pain processes (Gordon and Schwabe 2004; Kolta and Tessenow 2000), and the introduction of a foreign disease into Egypt (Fischer-Elfert 2011). The following discussion incorporates several of these studies in order to construct a cohesive Egyptian theory of disease transmission. My point is not to determine a simple and universal *source* for all diseases, an approach criticized by Quack (2003, 12), but rather to identify an overarching logic that explains the etiology and therefore treatment of illness in general. This serves as one of possibly multiple disease theories that cohesively act as cultural explanations of illness causation in ancient Egypt.

3.3 MATERIALS

There are two groups of texts that give us unprecedented access to Egyptian ideas about pathology and physiology: the *Oracular Amuletic Decrees* and the medical texts. Both were designed to offer comprehensive protection and treatment from the many and varied threats to an individual’s health. The following descriptions of each corpus demonstrate how they offer particular access into Egyptian thoughts on the agents and processes of disease transmission.

3.3.1 The *Oracular Amuletic Decrees*

In order to treat an illness, one must first determine its source. The *Oracular Amuletic Decrees* specifically name agents of illness as they aim to protect an individual from the variety of threats to health that one could experience throughout a lifetime. While these texts date to the 21st and 22nd dynasties—immediately after the occupation of the village of Deir el-Medina—they illustrate a well-established set of culturally shared ideas about disease and illness already in existence during the New Kingdom. Protective amulets from Deir el-Medina mention many of the same agents of illness found in the *Oracular Amuletic Decrees* (e.g., P. DEM 36, P. DEM 40) and include extensive protections that may have been functional precursors to these texts (e.g., P. DEM 44).

This corpus of 22 texts, published primarily by Edwards (1960a; 1960b),²⁰ were created specifically for children as apotropaic amulets; they were written along pieces of papyrus, then rolled and placed in a container to be worn around the neck. They include a prologue in which the deities guarantee the fulfillment of the oracular decree for the owner. The owners are identified, but referred to in a third person, indicating they were written by an intermediary.²¹

The decree then proceeds to offer protections from dangers to the individual and assurances of health. The latter are composed of repetitions of the phrase *jw=j*

²⁰ Edwards published 21 texts. Since then, only one additional Oracular Amuletic Decree has been published (Bohleke 1997). For additional publications on the *Oracular Amuletic Decrees*, see (Fischer-Elfert 1996; Lucarelli 2009; Wilfong 2013). Wilfong, who is currently composing a monograph on the *Oracular Amuletic Decrees*, offers several additional possible texts to include in this corpus. For more information on the provenance of these texts, including their full accession numbers, see Edwards 1960a.

²¹ This intermediary is usually unnamed, though in one case (P.1=P. Louvre E. 3234, recto 5) the intermediary is identified as a woman, Bekweret, though her identity in reference to the owner of the text is unknown. (Edwards 1960a, 79).

*snb*²² “I shall keep healthy,” followed by an anatomical list from head-to-toe (e.g., L.5=BM 10321, recto 11-14 “I shall keep healthy his right eye and his left eye, I shall keep healthy his ears, I shall keep healthy his nose,” Edwards 1960a, 29). Assurances of protection consistently use the phrase *jw=j šd=f*²³ *r NN* “I shall protect him against NN”. These protection formulae then list several agents of illness, creating an emic linguistic group. While the sequential organization of these groups of protections is difficult to analyze as it varies from papyrus to papyrus, the grouping of agents of illness itself offers a valuable and needed means for one to assess Egyptian categories of disease (Quack 2003, 7).

The groups of illnesses in the *Oracular Amuletic Decrees* are ideal for a holistic assessment of an Egyptian theory of disease transmission because they were clearly designed to protect an individual from any and all possible threats to one’s health. First, they were designed to endure for a lifetime (L1.=BM 10083, recto 10-12: “We shall keep her safe from leprosy, from blindness, and from the Udjat-eye [?] throughout <her> whole lifetime,” Edwards 1960a, 2). They reference childhood (e.g., L. 2, recto 4-6: “I shall open [her mouth to] eat and I shall open <her mouth> to drink,” Edwards 1960a, 14), adolescence (e.g., L. 5, recto 30-31: “I shall enable him to grow, I shall enable him to develop” Edwards 1960a, 30), and old age (Ch. r. 7-10: “I shall grant her life, health, and a great and good old age,” Edwards 1960a, 107). Second, they are intended to cover any and all dangers, with a long and specific list that is capped by overarching phrases to include anything overlooked (e.g., T.2 verso 113-116: “As regards everything which is in this oracle as well as those [things] the inclusion of

²² While some papyri use the first person singular, others use the plural implying the assurances of multiple deities. As Edwards indicates (p. 2, note 4), these phrases use the Late Egyptian third future construction *jw=f(r) sdm*.

²³ *šdj*, “to protect” (TLA lemma 158730; Wb 4, 563.2-9).

which has been forgotten, we shall make them beneficial,” Edwards 1960a, 72). Given their comprehensiveness, these texts give us access to the grouping of different agents of illness and can help us reconstruct categories of illness in ancient Egypt.

3.3.2 The Medical Papyri

The medical papyri offer a series of treatments for ailments relating to the variety of disease agents mentioned in the *Oracular Amuletic Decrees*. They have been extensively published in *Der Grundriss der Medizin der alten Ägypter* (Grapow et al. 1954-1973), which has more recently been updated by Westendorf (1998). The medical texts were additionally extensively published by Bardinnet (1995) and are summarized by Nunn (1996, 24-41). The corpus of medical texts is comprised of only about a dozen texts, several of which date to or around the New Kingdom, the period of occupation at Deir el-Medina (Table 3.1). The oldest text among these, P. Edwin Smith, likely dates between the 16th dynasty and the start of the New Kingdom (Allen 2005, 70-71; Breasted 1930, 28). This text is a copy of an older manuscript dating hundreds of years earlier, yet simultaneously it shares many similarities with the slightly later dating P. Ebers. This not only shows continuity in the medical tradition, but also suggests that medical knowledge in older manuscripts could have been available at Deir el-Medina.

Table 3.1 List of the most complete medical texts

The most complete medical texts	
Accession Number	Date of copy*
P. Berlin 3038	1200 BCE
P. Chester Beatty	1200 BCE
P. London (BM 10059)	1300 BCE
P. Hearst	1450 BCE
P. Ebers	1500 BCE
P. Edwin Smith	1550 BCE

* Dates are approximate and based on published dates by Nunn (1996, 25).

The medical texts are compendia of treatments, numbering as high as 877 in P. Ebers. They are explicit copies which maintain their original texts and modify them only through the addition of new medical treatments and glosses. These texts thus constitute long-standing ideas about disease and illness, contributing to our understanding of both theory of disease transmission and medical practice.

3.4 CAUSATIVE DISEASE AGENTS IN THE *ORACULAR AMULETIC DECREES*

Causative disease agents can be analyzed in two different ways: (1) who or what could manifest illness and (2) why did they exact it upon another individual. Despite the fact that the organization of these decrees is not systematic, reoccurring phrases allow us to determine the dominant causative disease agents in health concerns during the New Kingdom and early Third Intermediate Period.

Using the linguistic phrase $jw=j \check{s}d=fr$ NN “I shall protect him against NN,” I evaluate the various permutations of protections in the *Oracular Amuletic Decrees* to determine which agents of illness reoccur most frequently and which are most consistently combined. I group these in the following order based on which agents were mentioned most consistently: deities, demons, foreigners, poisonous animals, spirits of the dead, and internal ailments. The following discussion outlines each of these in detail, explaining the modes and reasons described in the *Oracular Amuletic Decrees* as well as the medical texts for their attacks on the body. Through understanding why and how these disease agents cause illness, it is then possible to understand how to defend against them.

3.4.1 Deities


Deities are the primary group repetitively mentioned throughout all of the *Oracular Amuletic Decrees*. These deities are often named, and the most common was “Sekhmet and her son,” mentioned in eight decrees. Her specific inclusion in these texts is based on broader correlations between Sekhmet and disease, including the role of *w^cb* priests of Sekhmet in hygiene (see chapter four) and Sekhmet’s control over demons which bring disease (P. Edwin Smith, verso 2.18-3.8). Manifestations of other state gods are also mentioned in 13 texts. The Theban triad is consistently prominent and suggests that many of these texts come from Thebes.²⁴ General references to the gods are mentioned as well to cover those unnamed (e.g., L.1 recto 50-55: “We shall keep her safe from every god and every goddess of the entire land, in heaven, on earth, in the South, in the North, in the West, and in the East,” Edwards 1960a, 6).

When referencing the gods, the reasons for their divine interference can be categorized into actions based on predetermined fates of an individual, actions taken arbitrarily against an individual due to other circumstances, or a directed attack against an individual. The concept of a predetermined fate is alluded to in passages protecting the owner of the decree from the book of “That-which-is-in-the-year” (L2, recto 77-78).²⁵ There was also a need to balance *maat*, and divinities could potentially exchange someone in place of another or seize someone when they were apparently otherwise unappeased (L1 recto 36-47). Finally, gods could act out against an individual as punishment for wrongdoing. The closest reference to divine punishment

²⁴ The provenance of these texts is largely unknown, except for C.1 (Cairo Museum 58035) from Saqqara (Edwards 1960a, xiii).

²⁵ Also, see references to a predetermined fate in O. Letellier from Deir el-Medina.

in the *Oracular Amuletic Decrees* is the protection against a “harsh oracle,”²⁶ though divine punishment is also attested outside of the *Oracular Amuletic Decrees*. Specific examples from Deir el-Medina show punishment from Meretseger (TR 058 3-4: “I committed the sin of disobedience against the peak and she gave me punishment,” Sadek 1987, 211) and Ptah (BM EA 589 verso 2-3: “I am the man who swore falsely to Ptah, the lord of Truth, and he caused [me] to see darkness in the day,” personal translation. Published as plates in James 1970, vol. 9, fig. 31).

While the gods had a variety of reasons to harm an individual, their exact means of infecting them are not well documented in the *Oracular Amuletic Decrees*. The medical texts, however, mention several ways in which the gods can cause illness in an individual. A god could send their own disease demons to cause illness indirectly, such as is most commonly mentioned with Sekhmet. Alternatively, a god could harm an individual through their influence (or even “stroke,” *s.t-ꜥ*, Ritner 2008, 56), shadow (*šw.t*)²⁷, or by infecting them with his or her *ꜥꜥ*, , poisonous semen.²⁸ The *ꜥꜥ* occurs most frequently, and symbolizes a physical manifestation of pollution from a divine source inside the body. The *ꜥꜥ* and other disease substances could cause illness in any part of the body by travelling through the *mtw*—a series of interconnected vessels of the body which could transport both air and blood and likely represented some combination of the cardiovascular system with other aspects of human anatomy from the urinary and nervous system (Nunn 1996, 44–49). These substances could

²⁶ In these texts, as apotropaic amulets for children, it may not be suitable to mention specific ill behaviors on the part of the owner of the text.

²⁷ *šw.t*, “shadow” (TLA lemma 152880; Wb 4, 432.6-433.10).

²⁸ *ꜥꜥ* reoccurs frequently throughout the medical papyri. Its definition as poisonous semen was first proposed by Grapow et al. (1961, 129–133), and later supported by Bardinet (1995, 123), Lang (2013, 99), and Nunn (1996, 63).

then manifest as worms (e.g., P. Ebers 296), an image which simultaneously evokes the malignancy of Apophis and the tangible association between parasitic worms and illness (Lang 2013, 110). They also spread *whd.w* throughout the body, which "may refer to all kinds of disease agents which will spread all over the human body through the vascular system" (Kolta and Tessenow 2000, 52), and is specifically suggestive of the spread of suffering (Kolta and Tessenow 2000) and corruption manifest by the body itself (Ritner 2000, 114; Steuer and Saunders 1959; Yoyotte 1968).

While deities could be sources of illness, they also could be sources of healing. In his letters to members of the community at Deir el-Medina, *Dḥwty-ms* asks them to pray on his behalf to Amun:

LRL 1=P. Leiden I 369, verso lines 3-6

Transliteration:

3. *jḥ dd=tn n jmn jn=j y3 wn mr=k(wj)²⁹ m-dj*
4. *pḥ=j m-ḥt³⁰ ḥr bn.tw=j m p3y=j šḥrw jwn3 tm³¹ djt ḥ3tj=tn m-ḥt wn t3y*
5. *š^c spr=tn jw= {tn}³² šm r p3 wb3.jt n jmn ns.tj-t3wj jw t^cy= {tn} n3 ^cddjw šrjw*
6. *j.jr m-^c=tn mtw=tn swnwn³³ n=f mtw=tn dd n=f šd=j*

Translation:

3. Please, tell Amun to bring me back. Indeed, I was sick when
4. I reached the North, and yet I am not in my (normal) condition. Do not allow your minds to go any further.³⁴ When this
5. message reaches you, you shall go to the open court of Amun of the Thrones of the Two Lands, and you shall take the young children
6. who are in your possession, and you will flatter him (Amun) and tell him to protect me.

²⁹ For dictionary references for the term *mr*, see page 131.

³⁰ Used for directionality (Wente 1967, 19, note q).

³¹ Translated as the negated imperative (Wente 1967, 19, note q).

³² Amended from *jw=j* (Wente 1967, 19, note q).

³³ TLA lemma 130320; Wb 4, 69.7-8; Lesko, Dictionary III, 24

³⁴ Literally, do not allow your hearts (to be in) the future

LRL 5=P. Leiden I 370, verso 19

- *mtw=k dd n jmn j.rwj³⁵ p3y mr ntj jm=[j]*
- And you shall tell Amun to remove this illness which is in me.

At the same time, these prayers can go unanswered. In an appeal for medicine to his son, the drafstman *P3y* says, *nb=j Jmn h3=f r=j* “My lord Amun, his back is against me” (O. Berlin P 11247, verso 4).

The will of the gods was thus a primary concern during the New Kingdom in Egypt, and medical treatments in many cases would have had to influence divine will in order to be effective. Though deities did not appear to enter an individual directly, they could use their divine semen or demons to introduce a contamination into a sick person’s body.

3.4.2 Demons³⁶

According to the *Oracular Amuletic Decrees*, demons were not only the malignant messengers of the divine, but also one of the dominant forces in spreading illness. This categorical link between demons, the gods, and disease can be seen in the placement of demons in the texts; in some cases, demons are mentioned among a broader list of gods (T.2 recto), while in others, they juxtapose protections against a list of diseases by name (T.1 verso). By associating the demons with disease itself, the Egyptian ideology blurs the boundary between symptoms, disease, and agent.

There are several different named types of demons, though those most prominently mentioned are the *h3.tjw*, *šm3.yw*, and *wr.t* (Lucarelli 2009). The two

³⁵ In this case, this form denotes indirect speech in Late Egyptian (Peust 1996). The following phrase (“remove this illness”) would thus be said by the recipients of the letter.




³⁶ Though there was no single word for “demons,” scholars have characterized these entities separately from the divine based on their orthography (Lucarelli 2010, 2).

former are usually mentioned in tandem and are attested in 15 of the *Oracular Amuletic Decrees*. These two sets of demons act under the will of the divine, specifically Sekhmet and Bastet (Lucarelli 2010, 3), and are sometimes mentioned in conjunction with similar sets of disease demons such as the *wpw.tjw* and *ns.yw*³⁷ (Breasted 1930, 476).³⁸ The *šmʒ.yw* were mobile (Lucarelli 2009) and the *hʒ.tjw* travelled by air (Breasted 1930, 476). In both P. Edwin Smith and in the Calendar of Good and Bad Days, these demons were seen as particularly virulent during epagomenal days—the five days at the end of the year (Leitz 1994, 44–55). This period was viewed as particularly dangerous owing to its liminal position at the boundary of the old and new year. The use of the falcon standard and dead man/evil³⁹ determinatives in their orthography suggests that they were both divine and malignant, and though the names are sometimes written in the singular, they are often referred to as plural entities (Edwards 1960a, 5, note 36).

Through this imagery, I suggest that disease demons were personified by pests, an idea corroborated by the placement of an incantation for cleansing a man who has swallowed a fly just after incantations against the disease demons in P. Edwin Smith (Breasted 1930, 482). Insects were thus tangible and visible representations of disease demons. This also explains the nature of these disease demons themselves as insects would have been more active after the inundation during the transition into the New

³⁷ These demons are mentioned in both P. Edwin Smith and P. Ebers, though in the former they are transliterated as *nds.jw*. The hieratic interchange/conflation of *ns* and *nds* is documented by Möller (1909, sign 161).

³⁸ Lucarelli suggests that these two sets of demons are mentioned together with the *wpw.tjw*, messengers (Lucarelli 2009, 236); however, the *wpw.tjw* only occur in three of the decrees (L. 6, T. 1, N.Y.) and are grouped with *SmA.yw* and *xA.tjw* in only one of these texts (N.Y.).


³⁹  (Z6) could be used to indicate either  (A14) or  (G37), though Gardiner advocates for the former in JEA 15 (1929), 51.

Year, would be more often identified in swarms rather than individually. Insects travel by air and—like the *wr.t* discussed below—are often found near standing water.

The *wr.t*, which Lucarelli differentiates as “guardian demons,” (2010, 4) are exclusively found in the *Oracular Amuletic Decrees* (Edwards 1960a, xxii).⁴⁰ They are mentioned in 14 of the *Oracular Amuletic Decrees*, predominantly feminine, and they are normally defined topographically (e.g., *wr.t* of a lake). In the majority of texts (9/14), the places associated with the *wr.t* are bodies of water, usually listing more than one (e.g., “We shall keep her safe from demons of a canal, from demons of a well, from demons of a river, from demons of a lake, from demons of a [pool] left [by the inundation],” L1 v. 21-26, Edwards 1960a, 13). It is appropriate, then, that the *wr.t* of the sky is the “foremost of *wr.wt*” (L.2 r. 32-33), as the sky itself was perceived as a great body of water, which the sun god traverses daily in his solar boat. The *wr.t* presumably can thus only attack an individual who is in their place, rather than moving at random to attack. Lucarelli suggests that, “The generally aggressive nature of the guardian demons is motivated by the need to protect their abode and is therefore sensible in some measure, as such, they are fundamentally different from disease demons, who invade the human body and other places they do not belong to” (2010, 4). Yet, this assessment may draw too fine a differentiation between the modes of attack and functions of the two. In fact, in the same article, she notes that *wr.t* can act as messengers of the god’s wrath as well (2010, 2). Instead, I suggest that in both cases, the disease demons would have been perceived as attacking an individual based

⁴⁰ The *wr.t* reappear later in the demotic self-dedication texts (Clarysse 1988; Thompson 1941).

on divine will and/or place, with victims infected because they are in the path of airborne or waterborne demons.

The disease demons were able to infect their victims through vicious attacks on the body. The orthography of *ḥ3.tjw* uses the knife determinative (T30, ) and in P. Leiden 346 I 1-3, the disease demons are described as those “who bring slaughtering about, who create uproar, who hurry through the land, who shoot their arrows from their mouths” (Borghouts 1978, 12). After attacking, they could then enter the body, as described in the following passage about a *nsj.t*-demon: *Jrt n z ntj d3⁴¹ sw nsj.t ntj ʕk m rwt*, “That which is done for a man whom a *nsj.t*-demon, who enters from the outside, attacks” (P. Berlin 3038, 9.7-9.8). These demons were thus the infection themselves, not only bearing disease but manifesting it inside the body through the whim of the deity. As Lang notes, “All such imagery expressed an idea of causal transmission, in which the malignancy of disease is physically transferred from Sakhmet's rage, through subordinate agents of hostility (winds, breath, or arrows) to the sufferer, where it became a pathological state of the body” (Lang 2013, 108).


3.4.3 Foreign Magicians

Foreigners, specifically magicians (*ḥk3.yw*), are also mentioned in 14 of the *Oracular Amuletic Decrees*. They are often mentioned just before or after demons, and are usually listed specifically by region (e.g., Nubian, Libyan, Syrian) in order to elicit culturally relevant ideas about the threats of chaos from the lands neighboring Egypt (Dieleman In Press). The texts protect against both the magicians and magic (*ḥk3*) itself.

⁴¹ This term (TLA lemma 181750, WB 5, 514.5-515.4) evokes the physical attack of the *nsj.t* demon. It is used in other contexts to denote stretching out the arm in hostility and therefore striking or attacking the victim. For this syntactical structure, see Westendorf (1961, sec. 243.3).

Magic could be either a beneficial element for healing (P. Edwin Smith, case 9, verso 5.1) or a harmful one that could enter inside someone, such as in P. Ebers 165 (34.3), where the treatment is a *dr ḥk3 m ḥ.t* “removal of magic from the belly.”⁴² Similar to the disease demons, magic within the body creates the disease itself. Medical care would thus ideally treat the sick by removing the magic, and protecting an individual from repeated attacks by the malevolent foreigner.

3.4.4 Poisonous Animals

When referencing animals, the *Oracular Amuletic Decrees* specifically protect the owners “from serpents, from scorpions, and from every mouth which bites” (L.2 recto 6-8, Edwards 1960a, 14). It is interesting to note that these texts do not specify other dangerous ways animals could cause traumatic injuries through clawing or ramming the body. Instead, the focus is on these poisonous bites and stings, which are mentioned in 13 of the texts. The need to protect against snakes and scorpions specifically thus demonstrates that the fear is not only of trauma, but of bites or stings that introduce poison into the body. The poison of these animals is described as *mtw.t*,⁴³ , a similar kind of poisonous semen to the *ʕʕ* and the term used for Seth’s semen in the *Contendings of Horus and Seth* (Gardiner 1931). The unwelcome excretion of *mtw.t* through either bites or stings was thus analogous to Seth’s rape and ejaculation. This in turn lends a layer of interpretation onto Seth’s attempted rape. His objective to prove his power and precedence over Horus would have also been perceived as a bodily attack and perhaps even an attempt to infect Horus with illness.

⁴² *ḥ.t* refers specifically to the region of the body in the front of the torso, rather than a specific organ (Walker 1996, 91).

⁴³ TLA lemma 77490; Wb 2, 169.5-8; DrogWb 292.

3.4.5 The Spirits of the Dead

The *Oracular Amuletic Decrees* show extensive protections from both the *mwt* and *3hw*, spirits of the dead⁴⁴ (Lucarelli 2009, 232–233). They are mentioned nine times in the decrees and usually differentiated between male and female.

The medical texts often mention the spirits of the dead in conjunction with the gods as both used the same indirect methods to disease an individual, namely their influence, shadow, and semen. The fact that the medical texts protect against the semen of both male and female dead further suggests that the female dead maintain their regenerative abilities after their gender transformation in death (Cooney 2010).

Pain and suffering itself was a sign of the attempts of the dead and other disease agents to force their way into the body and use their secretions to infect it. In P. Leiden I 348 (recto 6.4-6.8), a spell against a headache demonstrates this clearly (Borghouts 1978, 27–28):

Backwards, enemy (xfty), fiend (pfty), male dead (mt), female dead, and so on who cause this suffering to NN born of NN. You have said that you would strike a blow in this head of his in order to force your entry into this vertex of his...Retreat, recede for the striking power of this burning eye of his. It will ward off your striking power, it will dispel your ejaculation (aAa), your seeds (mtw.t), your harms (nkn), your digestion products (jwtjw), your oppressions (gAw.t), your wrongdoings (jsf.t) your torments (mr), your inflammations (wxd.w), your afflictions (nqm), heat (Smm) and fire (x.t)—all the bad things which you have said: ‘he will suffer from them’—as you have acted accordingly.

In this example, the dead and enemies of the patient are actively choosing to attack the head of the individual, and if they successfully create an opening, they can infect their

⁴⁴ The *3hw* are often referred to as the blessed dead vs. the *mwt*, the damned dead. This differentiation is noted in Wb 2, 166.10-17 and Wb 1, 15.17-16.10. These terms are most recently summarized by Janák (2013).

victim with their ʕ as well as symptoms such as šmm. Thus, even actions that attack the outside of the body may have been intended to create internal contamination.

Appeals to mwt and ʕh, in the form of letters to the dead (e.g., P. Leiden I 371), also demonstrate that the Egyptians needed to appeal to the will of the dead directly in order to stop them from causing illness.

3.4.6 Internal Corruption

In the majority of the *Oracular Amuletic Decrees*, the owners are protected from a list of diseases. This list varies considerably between texts, and few of the diseases can be positively identified.⁴⁵ What can be said is that the majority of these diseases use the pustule determinative or are mentioned as an illness (*mr*) or ailment (*šn.w*)⁴⁶ of a part of the body. Diseases could also be defined by duration of anywhere from one to ten days.⁴⁷ While the actual source of some of these is not stated explicitly, their separate inclusion in nearly all of the *Oracular Amuletic Decrees* show the need to state protections against specific diseases.

At the end of this disease list in L.1, the decree attempts to cover all diseases by stating protections against any “internal ailment” (*hnw*) and from any “sickness” (*mr*) that has ever happened (L.1 verso 44-45). This passage suggests that illness could not only occur from external sources, such as ʕ or disease demons, but also could manifest internally.

The differentiation between the external and internal cause of illness is further outlined in case eight, gloss D of P. Edwin Smith: *Jr ʕkt m rw.t tʕw pw n ntr n rw.t mwt r-*

⁴⁵ Some scholars such as Ebbell have attempted to identify diseases from the texts, only to be easily dismissed by later scholars (see Nunn 1996, 30-31 as an example).

⁴⁶ TLA lemma 155360; Wb 4, 495.1-7; MedWb 857.

⁴⁷ See L2 v. 17-18, T2 r. 117-118, P3 r. 78-81.

pw jn sꜥꜥt n ꜥmꜥt ꜥꜥw=f, “As for ‘Something which enters from outside,’ it means the breath of a god from outside or of a dead person. It is that which enters; his flesh did not create it.”⁴⁸ The text specifically suggests that, while in this case, the disease originated from the exterior, the illness could have also been created by the body itself.

Additional texts on illness show us that illness manifests inside the body as undigested food that can become diseased feces and travel outward from the stomach (P. Ebers 30, 10.9). These feces do not only pollute the body, but can create blockages within the stomach and can spread to the heart (P. Ebers 855g). These feces develop when food remains undigested in the stomach: *nn*⁴⁹ *jw pw n wꜥm tm rdj wꜥm=f*, “It is inertness of food. It does not allow him to eat more” (P. Ebers 189, 36.21-37.01). The next paragraph specifies further that, *ꜥrw.t n.t ꜥs* “clumps of excrement,” can cause suffering throughout the body (P. Ebers 190, 37.5-37.6). The food appears to be decaying inside the body, thus creating a block within the stomach that can then be spread throughout the body via the *mtw*. Similarly, if the process of digestion is somehow reversed (*ꜥn*, turning around⁵⁰), feces can infect the *mtw* and thus spread disease around the body. Consequently, while food can result in internal contamination, it does not introduce the contamination in the body on its own; it requires that the body, through aberrant actions such as reversals or blockages, disease itself.

⁴⁸ In this passage, Breasted interprets *jn* as a negative (1930, 214), while Meltzer assumes no negation at all (Sanchez and Meltzer 2012, 88). The most convincing translations of this passage are from Bardinet (Bardinet 1995, 500) and Westendorf (1998, 720), who translate *jn* as a non-enclitic particle, while *n* is used to negate. This emphasizes the fact that, regardless of its source, the disease is from outside rather than being created by the body itself.

⁴⁹ The verb *nmj* (TLA lemma 84820; Wb 2, 275.2-8) literally means to be weary or to be inert. It connotes a distinct lack of movement.

⁵⁰ TLA lemma 850556; Wb 1, 188.13-189.7; Lesko, Dictionary I, 77.

3.5 CONTAMINATION: A LOGIC TO DISEASE IN ANCIENT EGYPT

Based on the information presented above from the *Oracular Amuletic Decrees* and the medical texts, I argue that one dominant Egyptian theory of disease transmission was founded upon a principle of contamination of the body. The concepts of contamination and pollution within the body are defined and discussed by Douglas (1966) in her anthropological research on ritual acts of purification. Douglas argues that the boundaries of the body become liminal at the orifices where bodily secretions can both represent the self and simultaneously be considered pollutants. Orifices are as well points of entry for foreign contaminants from outside the boundaries of the body. This introduction of the foreign inside the body thus contaminates it, and it becomes necessary to remove the foreign pollutants in order to return the body to its natural and pure state.

The above analysis of the *Oracular Amuletic Decrees* and medical texts demonstrate that in Egyptian thought, the body can be contaminated by a foreign substance that then is adulterated by the body itself. The body could improperly digest food, for example, which causes blockages and introduces pollution into the body via the *mtw*-channels. These pollutants can then manifest into worms—animated representations of this contamination that were not only present figuratively, but probably quite literally in the stool of sick individuals infected with parasites.

One could also be contaminated by the secretions of others—poisonous substances which enter from outside the body, infect the *mtw*-channels, and spread primarily to two key places in the body: the stomach and heart. This external poisoning is unambiguously documented by charms to protect against the poison (*mtw.t*) of snakes and scorpions, with an emphasis on removing it from the body. The

complementary meaning of *mtw.t* as semen then links us to a form of divine contamination from the outside: ꜥꜥ-poison. This poisonous semen was introduced by deities and the dead, allowing them to infect their victims through malevolent attacks on the body itself. Thus, some ailments, such as headaches, represent attacks designed to contaminate the body.

The individuals could also be contaminated by malignant beings themselves: the disease demons. These small bands of disease-carrying organisms are associated with the wind and water, and could thus be inhaled or consumed. They could also force their way into the body through malicious attacks. Once in the belly or stomach of an individual, they could contaminate the rest of the body, just like the other substances discussed above. The disease demons thus simultaneously represent the agency of disease and the substance of its transmission. The disease demons, gods, and even worms that are born from contamination are all independent animated beings, and thus capable of independent agency in contaminating. This independence is critical when considering strategies for removing or destroying illness.

While all disease thus appears to be based on contamination, the separation of internal vs. external contaminations may have resulted in their own etiological causes and effects. The interior pollutants often manifest as digestive disorders, as the onset of the illness is usually associated with an irregularity in the stomach or stool. Exterior pollutants, on the other hand, were more likely representative of infectious diseases. In this sense, Egyptian theory of external diseases—the introduction of disease-causing substances and organisms into the body—is founded upon the concept of infection.

Contamination theory is consequently strikingly similar to modern germ theory. I am not attempting to argue that contamination theory includes an understanding of

the biological mechanisms of infectious disease, nor that it was a precursor to germ theory, but rather that its similarity to popular depictions of germ theory betray how ancient Egyptian notions regarding disease and medicine are neither outlandish nor unfamiliar in the modern world. Modern commercials for medicinal products depicting illnesses as infective monsters, attacking and forcibly entering the body, attest to these similarities. Advertisements for Lamisil anti-fungal cream (“Lamisil” 2014) show a demonic, fiery dermatophyte breaking its way into the nail bed. Those for Mucinex (“#BlameMucus” 2014) show a family of mucus monsters, who are forced to ‘move out’ of their host by the medication. Advertisements for the cold treatment Zicam (“ZICAM®” 2014) personify colds as monsters chasing after their victims. While some scholars would argue that emic Egyptian ideas about disease demons or other invisible divine beings as contaminants are illogical (David 2004), these parallels to modern, popular representations show that they are not far removed from popular depictions of modern germ theory.

3.6 ANCIENT EGYPTIAN MEDICINE AS A RESPONSE TO CONTAMINATION

3.6.1 Defining Medicine

Before discussing how ancient Egyptian medicine was a response to cultural understandings of disease, it is important to define medicine itself. Previous scholars have attempted to distinguish differences between medicine—described as a practical application of rational treatment—from its irrational counterpart, magic (Leake 1952; Sauneron 1957).⁵¹ Other scholars have avoided discussing magic within the context of

⁵¹ For example, Leake differentiates medical texts contents as “professional material” from “popular magic,” suggesting the latter is not professional (1952, 15) and even calls it primitive (1952, 34). Further, he indicates that the rationality of medical texts in the Old Kingdom show a

medicine altogether (Ghalioungui 1983, 48; Grapow et al. 1954), erasing “magical” treatments from their medical context.

This debate and differentiation between medicine (i.e., surgical procedures)⁵² and magic (i.e., spells to cure poison from a scorpion),⁵³ is based on a narrow view of scientific rationality which is founded on three fundamentally erroneous assumptions. First, authors assume that the Egyptians made a clear differentiation between the natural and supernatural, with the former belonging in the purview of science and medicine while the latter is strictly magical (David 2004). As Lang (2013, 127) points out, however, such a dichotomy did not exist:

The supernatural cannot exist without its exclusion from some prior definition of the natural, but there is no equivalent distinction in Egyptian thought. Whatever else disease demons may be, in Egyptian texts they have the same existence status as the rest of the Egyptian cosmos --- they are in this sense perfectly natural objects.

This lack of a differentiation is clear in the texts themselves. In case nine of P. Edwin Smith, a head wound with a comminuted fracture, the treatment fluidly transitions from prescribing a medical bandage wrapped around a poultice for the wound to a magical incantation to cleanse the blood effectively and protect it from getting infected (Breasted 1930, 219-224).⁵⁴

Second, scholars have erroneously suggested that magic, being separate from medicine, can only act as a placebo which benefits from the coincidental recovery of an individual, rather than having its own ameliorative affects (Gordon and Schwabe 2004).

shift toward irrational magical beliefs later in Egyptian history (1952, 77). At the same time, Leake acknowledges the existence of similar belief structures in modern England.

⁵² See, for example, P. Edwin Smith, r. 1, 12-17 (case 2).

⁵³ See, for example, P. Chester Beatty XI, r. 4, 7-8.

⁵⁴ Breasted describes this case as a “curious hodge-podge of superstitions, without a suggestion of the scientific attitude of mind which is so prominent in the ancient surgeon’s discussion of the other cases,” 220.

Recent research into placebo medicine, however, has demonstrated that placebos can offer their own health benefits; placebos affect the same neurological pathways as Western medicine resulting in significant physiological responses such as increased pain relief, stimulated immune responses, and adjusted serotonin and dopamine levels (Finniss et al. 2010). Furthermore, these placebos can be significantly effective even when the recipient realizes they are receiving a placebo (Kaptchuk et al. 2010). The kind of ritual involved in medicine further affects the equation; in one study, personal care and attention during treatments with a placebo pill generated 18% more pain relief than the pill alone, and 34% more relief than no treatment (Kaptchuk et al. 2008). What this essentially suggests is that these treatments traditionally deemed magical—which often involve personal attention and care—can offer significant health benefits of their own and cannot be so easily separated from “medical care.”

Third, the differentiation of rational medicine and irrational magic implies a universally understood rationality behind the development of Egyptian medical treatments. Leake even suggested that Egyptian medicine must have devolved from its rational approach in the Old Kingdom to an irrational one in the New Kingdom because of an increase in the number of spells in medical texts (Leake 1952, 77).⁵⁵ Through focusing on the sources of illness, however, it becomes apparent that Egyptian medical care is rationally dictated by the sources of illness (Nunn 1996, 96). When divine sources are involved, treatments directly affecting the divine are necessary. Conversely, when the source of the illness is traumatic, surgical treatments are necessary.⁵⁶ In some cases, a divine source must be combined with a physical

⁵⁵ This supposed difference is based on the dating of the original copy of the Edwin Smith Papyrus.

⁵⁶ A similar logic was proposed by Nunn (1996), 96.

treatment in order to treat both the source and symptoms (i.e., P. Ebers 3). By focusing on these sources of illness, one can then understand, from an Egyptian perspective, the necessary paths to take for medical care, whether they are surgeries, remedies, incantations, or some combination. This approach explains why certain texts, such as the recto of P. Edwin Smith, may contain primarily surgical cases and treatments since the majority of these cases deal with traumatic injuries to the upper body. It further explains why some remedies applied to the body are made more effective through the addition of an incantation. In these cases, the remedy may be treating symptoms, but the incantation is meant to contend with the divine cause of the sickness. As Ritner points out, “the very presence of a spell within a medical context has sufficed to stigmatize that recipe as ‘magical’ even when the accompanying format for treatment is indistinguishable from others within the same papyrus” (2008, 5). Ritner’s commentary shows that Egyptians did not create a boundary between magic and medicine, using a combination of spells, topical remedies, and surgery to provide medical care for an individual. Consequently, I define all treatments designed to improve the health of an individual as “medical,” without attempting to determine a difference in those treatments which are deemed rational or irrational, magical or medical by other scholars.

3.6.2 The Medical Process

As already demonstrated through the *Oracular Amuletic Decrees*, medical care could be provided through a preventative apotropaic approach using amulets as defenses against potential attacks from malevolent forces. Such objects would have to be ritually charged and may have been focused on some of the most threatening agents of illness for a specific group. This proactive medicine could thus only be

performed by individuals capable of communicating and acting as intermediaries with the divine.

The medical process was also, of course, reactive as documented in the medical texts. These texts show treatment protocols designed to address an illness when an individual requires some kind of medical attention. The process of treatment is most consistently outlined in P. Edwin Smith, though the other medical texts occasionally show several of these steps (e.g., P. Ebers 189, column 36.17-37.4). This process is outlined in Figure 3.1 and described below in order to demonstrate how contamination theory affects and dictates medical care.

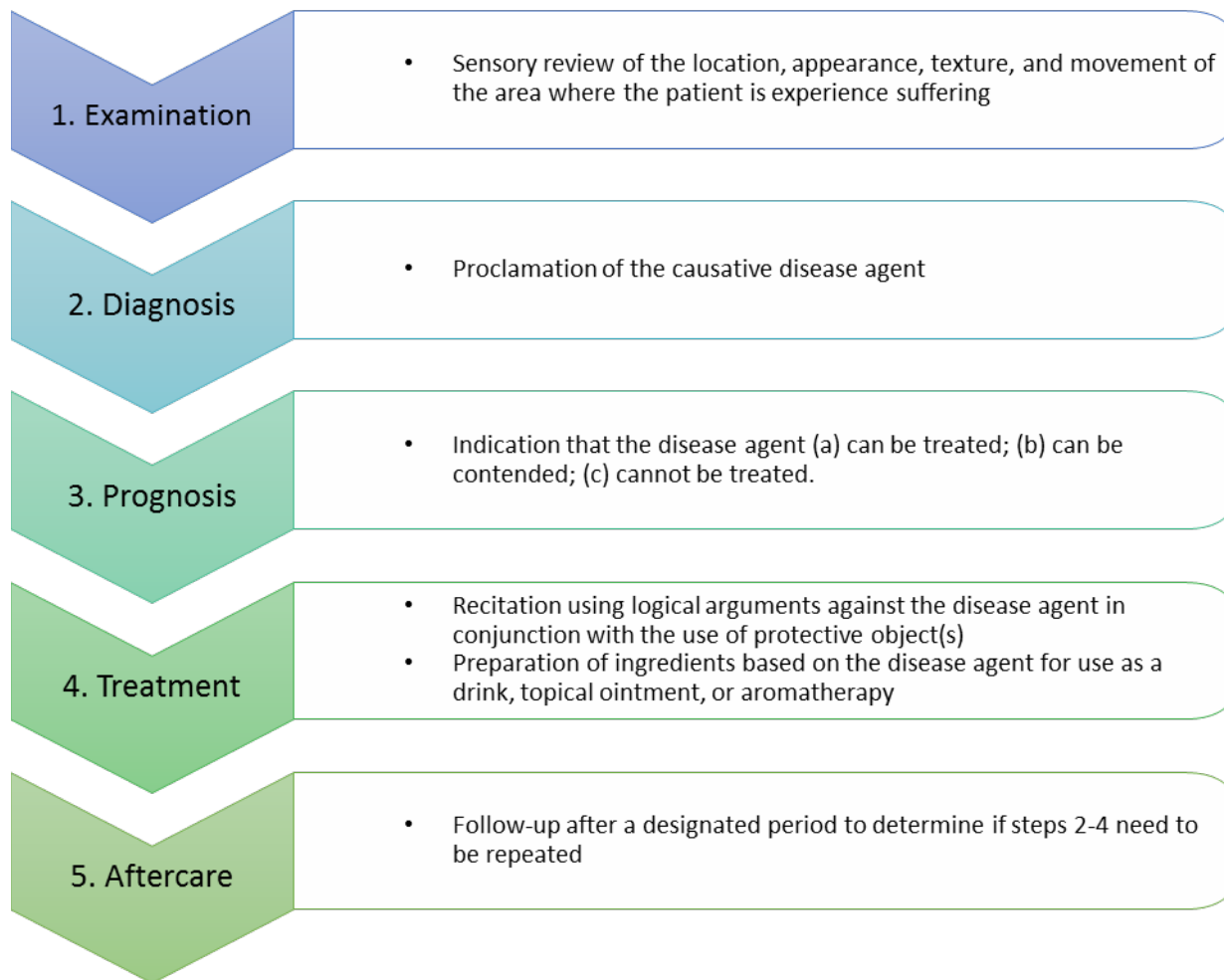


Figure 3.1 Outline of the Egyptian Medical Process

First, a patient is examined. The examination allows the practitioner to use observations in order to attribute the original cause of the symptoms, and thus the examination dictates the path of the following steps in medical care. The medical texts illustrate this through the phrase *jr h3=k z X* “If you examine a man who X.”⁵⁷ The text then proceeds to specify the location(s) of pain or suffering, reported symptoms, and observations made by the physician on the appearance of the body and the physical traits of the lesion. The majority of these are felt through palpitation, *dʿr.hrʿk wbnwʿf* “you should feel his wound”; *X hr db3.w=k* “X is under your fingers.” The physician feels for the texture, rigidity, temperature, and movement under the skin. Essentially, the physician is attempting to identify whether a contaminant is present inside the body, and in turn, determine the nature of the contaminant (e.g., whether it is inert or moving which could differentiate feces in the *mtw*-channels from or a disease demon).



Following the examination, the practitioner proclaims the diagnosis out loud to the patient, *dd.hr=k X pw* “Then you shall say: ‘It is X’.” This step indicates the actual underlying cause of the illness for which a treatment protocol can then be designed. Unfortunately, the majority of texts do not record the full diagnosis; that is partially because many treatments are sequential, and thus likely refer to an earlier diagnosis. A diagnosis can indicate a specific causative agent, such as a named deity or demon, causing the illness. By identifying the causative agent, the practitioner can then also identify a treatment that can effectively remove the disease agent from the body either physically or through logical persuasion.

⁵⁷ For the verb *h3j*, see TLA lemma 113400; Wb 3, 223.2-3; MedWb 644-646.

When a diagnosis is suggested, it can often name a series of agents. For example, a treatment for a headache in P. Leiden I. 348 wards against an “enemy (*hfty*), fiend (*pfty*), male dead (*mt*), female dead, and so on” (Borghouts 1978, 27). It goes on also mention multiple means of contamination: “your ejaculations (*ʕ3ʕ*), your seeds (*mtw.t*), your harms (*nkn*), your digestion products (*iwtjw*), your oppressions (*g3w.t*), your wrongdoings (*isf.t*), your torments (*mr*), your inflammations (*wḥd.w*), your afflictions (*nKn*), heat (*šmm*), and fire (*ḥ.t*)—all the bad things of which you have said; ‘he will suffer from them’—as you have acted accordingly” (Borghouts 1978, 28). Thus, while it is helpful to know both the causative agent and the means by which it contaminates, this diagnosis suggests that in ambiguous cases, treatments could address multiple causative agents simultaneously to be most effective.

The diagnosis is followed by a prognosis in which the practitioner indicates whether or not a treatment protocol can be followed. In P. Edwin Smith, there are three possible prognoses (Breasted 1930, 46; Sanchez and Meltzer 2012, 10-11):

1. An ailment I will treat (*mr jry.j*)
2. An ailment with which I will contend (*mr ʕḥ3=j ḥnʕ*)
3. An ailment not to be treated (*mr n jr.w.ny*)

These three prognoses show that Egyptian medical practitioners approached treatment as a means to heal and/or relieve an individual from their suffering. The first and second prognoses are clear evidence of attempts to treat and therefore heal an individual, with the first assuming that the illness is invariably treatable. The second, on the other hand, is ambiguous and reveals the underlying cultural perception of the medical process as a battle. The term *ʕḥ3*, ‘to fight’ , embeds this concept orthographically through the use of the hieroglyph D34 , two arms bearing a battle-

axe and shield, as well as A24 ^uh, the determinative of a man striking with a stick. Thus, the use of the term ^hh3 demonstrates that the practitioner was fighting against the disease agent, personifying the illness as an enemy to be destroyed or removed.

If a practitioner could not treat an illness, they could still use medical intervention to attempt to relieve an individual; in some cases when individuals received the third and most hopeless prognosis, they were still given care (e.g., P. Edwin Smith, case six). Medical care was thus provided to at least prolong life or reduce suffering, even when death was presumed inevitable.

After prognosis, the practitioner follows a protocol outlined in the texts for subsequent treatment. In many examples from the medical texts, the treatment is the only step in the medical process described, and thus it is the most extensively documented step in the medical process. Treatments may have involved surgical care, a remedy to be swallowed or topically applied, an incantation, or some combination of these strategies. Remedies (*phr.t* or *zp.w*) and incantations (*r3* or *šnt*) were often structured into the title of a treatment protocol, suggesting that the practitioner prioritized one strategy over the other in certain treatments, even when both may be included (Dieleman 2011, 93). The medical texts also structure multiple remedies for the same illness together by introducing new remedies with the simple phrase, *k.t* “another one.” These alternative remedies were likely used as part of a reiterative process during the course of medical care for an individual; a physician could prescribe a treatment, check on the symptoms and progress, and continue with a secondary treatment, until the individual recovers. These steps could then continue to be reiterated, as demonstrated in P. Edwin Smith, case seven when the initial

examination, diagnosis, and treatment are followed by a secondary exam and diagnosis as well as a final tertiary examination, diagnosis, and treatment.

The majority of medical treatments focus on the removal (*dr*⁵⁸ or *srwj*⁵⁹) of demons, magic, poisonous semen, and other contaminants from inside the body. Common medical prescriptions were drinks to be consumed as laxatives, purgatives, or diuretics to forcibly remove contamination from the body (e.g., P. Berlin 3038, 8.6-8.7). The body could alternatively be purged through the use of incense (*k3p.w*⁶⁰) since contaminants can also be inhaled (e.g., disease demons who travel on the wind).⁶¹ Topical remedies may have been used in cases where contamination occurred through the skin or as a protective boundary to prevent agents of disease from entering the body.

In general, treatments utilized several logical principles in order to eradicate the specific disease agent(s) at hand.⁶² Medicinal recitations included several logical arguments to give them a ritual charge as outlined by Sørensen (1984), including equating the patient or practitioner with a deity, equating the illness with a mythological precedent, or threatening the cosmos. Ingredients for medicine also follow several lines of logic in order to be efficacious as outlined by Ghalioungui (1983):

⁵⁸ TLA lemma 180130; Wb 5, 473.1-474.12. Through the use of the forearm with stick determinative (D40), this takes on the connotation of an aggressive action, such as “to drive away; to repel.”

⁵⁹ TLA lemma 139300; Wb 4, 193.9-12; MedWb 775.

⁶⁰ From the verb *k3p*, “to cense or to fumigate,” TLA lemma 163310; Wb 5, 103.9-15.

⁶¹ For several examples, see cases 66-70 in P. Berlin 3038, 6.6-6.11.

⁶² These have already been more broadly described in scholarship on the mechanisms of magic (for overviews, see Ritner 2008; Schneider 2000; Sørensen 1984).

1. *Identity*: The ingredient is chosen based on similarities in its identity with the product, such as a red stone used to stop bleeding (Halioua et al. 2005, 27);
2. *Solidarity*: Individual parts of the body can be used to represent the whole. Consequently, a part of the body (hair) can be used to represent the entire person;
3. *Homeopathy*: Similar things can be used to eradicate each other. This may be why feces are mentioned so frequently in prescriptions in the medical texts (Nunn 1996, 149), as they would be used to battle contaminating feces within the body. Homeopathy does not require a literal substitute, but rather a figurative one. For example, a later text from the Greco-Roman period specifies that when the recipe calls for crocodile dung, it is actually represented by Ethiopian soil (Pinch 1995, 26).

The logical arguments used for recitations and ingredients were consequently specialized to the contaminant and viewed as effective only if the correct causative disease agent was identified and removed by the practitioner. The texts often designate the period of time for the treatment (frequently four days), and in some cases include follow-up care to determine whether the patient's health has improved sufficiently. In cases where the individual is still sick, the steps in medical care could be repeated, especially to treat alternative disease agents if the incorrect one had been initially identified.

There was clearly a concern that someone could get sick again, even after effective treatment, and one component of medical care would have been actions to prevent this from happening. Rituals specifically aimed at purifying both an individual and their space were viewed as effective means to prevent someone from being (re)-

contaminated. Specifically, the *wꜥb* priests of Sekhmet were medical professionals whose purpose was to purify individuals, especially the sick, through washing to remove and eradicate contamination and illness (Engelmann and Hallof 1996). Through cleansing with pure water in a temple context, ritual hygiene thus allowed for both physical and religious protection against disease. Additionally, medical texts explicitly describe methods to purify a space and objects in daily life, in order to seal and protect them from contaminants (Rosenow 2008). For example, in the seventh incantation of P. Edwin Smith (Breasted 1930, 483–486), the treatment is designed to decontaminate and purify beds, daily life objects that could also house contaminants.

Overall, whether preventative or reactive, the entire medical process follows a basic logic dictated by contamination theory. One attempts to identify causative disease agents during the examination and diagnosis, and then remove them and protect a patient during treatment and care. This process thus requires that one is aware of the many and varied potential disease agents, with enough knowledge to enact persuasive logic and enough resources to access analogous materials for treatments. How is this knowledge accumulated and how does that process, in turn, affect medical care in daily life?

3.7 MEDICAL TEXTS FROM DEIR EL-MEDINA

The previous arguments are based on a larger corpus of texts relating to medicine and disease in Egypt. They tell us about the broader practice of medicine as well as the thought processes behind medical care and illness. En masse, however, these texts tell us relatively little about how medicine was practiced on an individual basis. How do medical documents from Deir el-Medina, when contextualized to their

intended owner, help us to understand how Egyptian medicine was practiced in everyday life?

3.7.1 Medical Handbooks at Deir el-Medina

The majority of medical texts from Deir el-Medina come from the *Kn-hr-hpš=f* archive, a set of papyri found together that had been maintained within one family. *Kn-hr-hpš=f* and his family are particularly well known residents of Deir el-Medina owing to *Kn-hr-hpš=f*'s long-held status as scribe and the unusual preservation of his large collection of papyri. They are published primarily by Gardiner (1935) in association with the British Museum and were clearly written in multiple hands spanning several decades in the Ramesside period, suggesting that these records were maintained and augmented by multiple generations. The majority of the papyri recovered in this collection include some kind of preventative or reactive medical text (see Table 3.2). Those papyri in this corpus without a medical function are generally fragmentary (e.g., Chester Beatty 10-14), and may have included a text for healing or protection that Gardiner was unable to reconstruct.

Table 3.2 Medical texts in the Chester Beatty Collection

CHESTER BEATTY #	BM #	DESCRIPTION OF MEDICAL CONTENTS
5	10685	Amuletic recitations for removing headaches and scorpion stings
6	10686	Incantation against a <i>nsj.t</i> demon Topical remedy for removing injury Remedies for the anus and bladder
7	10687	Recitations for removing the poison of scorpions Recitation against fever
8	10688	Oral remedy for removing poison of a god, dead man, or dead woman Recitation for protection of each part of the body, organized head-to-toe as a means of purification Amuletic recitation to protect from dead, demons, and the magic of enemies
9	10689	Fumigation to remove an illness

15	10695	Oral remedy against a dead man or woman Protection against an “enemy who is in the tooth of N” (Gardiner 1935, 1:136)
16	10696	Recitations of purification
18	10698	Very fragmentary medical texts

The prevalence of preventative and reactive medical texts in this corpus, and the relative lack of medical texts outside of it at Deir el-Medina, suggest two things. First, most medical texts were documented on papyri. In general, very few medical ostraca have been identified in Egypt,⁶³ perhaps due to the length of medical texts which often involve multiple treatments for the same illness. This preference for papyri makes the medical texts even more elusive at Deir el-Medina, as the majority of preserved texts we have come from ostraca. Second, despite the fact that no member of the family of *Ḳn-ḥr-ḥpš=f* was identified as part of a medical profession, the family still owned texts specifically medical in nature. The texts even include a passage mentioning that the treatments are specifically for the use of a *swnw*, physician (P. BM 10686, 6.8-6.10). This may either suggest that there was a special interest in medical papyri within this family, or, as is more likely, that medical texts could be privately owned by individuals with levels of literacy that were high enough to understand them. The purposeful retention of grammatical traits from Old and Middle Egyptian (e.g., in P. Edwin Smith) in conjunction with the use of specific medical terminology in these texts serves to relegate them to only the most literate and makes them more exclusive.

What motivated this control over medical knowledge through private ownership and specialized terminology? One possibility is the commodification of medical care. As demonstrated in the next chapter, medical services were paid, and therefore

⁶³ Only four ostraca are translated in the *Grundriss* (Grapow et al. 1954). A total of eleven ostraca are mentioned elsewhere (Stuhr 2011).

medical knowledge could be used to further a workman's wealth through private transactions providing medical care to individuals outside of the community. Secrecy and control of the medical texts therefore could have reduced the number of people with this specialized knowledge. Deir el-Medina scribes like *Kn-hr-hpš=f* would have been ideally situated to use medical knowledge as a commodity. On the one hand, they had access to the literacy necessary to understand and compile medical texts—knowledge usually reserved only for the elites. On the other, as members of a community defined as a royal labor force, they would have wanted to seek out opportunities to enhance their financial and social position. Therefore, they had both the skills and motivation necessary to develop and maintain these medical texts.

3.7.2 Medical Ostraca

Despite the preference for papyri, we still find some medical texts on ostraca, particularly at Deir el-Medina. Out of the 10 medical ostraca identified by Stuhr (2011),⁶⁴ nine date to the New Kingdom and at least six of these were recovered from Deir el-Medina (Table 3.3). This begs the question: why separate individual treatments onto ostraca in the first place, if it was indeed more economical to place a series of treatments on papyri?

I suggest that these ostraca were specifically created in order to transfer knowledge between scribes, as lists for procuring ingredients, and as a means to augment an existing medical papyrus. Therefore, while medical papyri were developed and maintained as rubrics for general treatment for non-specific cases, the presence of medical ostraca attest to the individualized medical care provided at Deir el-Medina.

⁶⁴ This excludes O. Turin 57104, a list of parts of the body, as this list is not necessarily for medical purposes.

Their dominance in the medical ostraca is a product of the archaeological record. They represent individual instances of daily life medical care, and thus are better documented at Deir el-Medina owing to the unusually large number of ostraca relating to daily life at the site.

Table 3.3 Medical Ostraca from Deir el-Medina

ACCESSION #	DESCRIPTION OF MEDICAL CONTENTS
O. DEM 1062	Treatment against a dead man or dead woman entering the eyes
O. DEM 1091	Two rash treatments and one heart remedy
O. DEM 1213	Recitation against a scorpion sting
O. DEM 1216	Treatment for suffering in the stomach
O. DEM 1242	Too fragmentary to determine the ailment
O. DEM 1263 ⁶⁵	Recitation against poison from a scorpion
O. DEM 1414	Too fragmentary to determine the ailment
O. GARDINER 30	Recitation against a demon for <i>k3-dr.t</i>
O. TURIN 57163	Possibly a treatment for the stomach

Note: This table is based on facsimiles, transliteration, and translation published online by Stuhr (2011).

In most cases, these texts appear to have only one treatment on them, which is written using the same conventions as the medical papyri including a rubricized title followed by a treatment protocol with a list of ingredients, the mode of application, and the duration of treatment. These individual treatments could have been transferred from one scribe to another; a transfer made to facilitate care in cases where an individual was suffering from a particular ailment. This would explain the need to excerpt an individual text, as well as the placement on portable ostraca in cases where the scribe is not local.

⁶⁵ My research is based on the combined translation of P. Turin 199, P. Chester Beatty XI, O. Petrie 7, O. Queen's College 1116 (Borghouts 1978, 50).

Indeed, such a case has been recovered among the documents at Deir el-Medina.

The following medical text, P. Geneva MAH 15274 + P. Turin CGT 54063 verso, documents the transfer of a spell against poison between two scribes (verso, 2.1-2.7):

Transliteration:

1. *Rnp.t-zp 3 3bd 3 3ht sw 28*
2. *r^c pn [jyt] jn zh³w p³-hm-ntr*
3. *hr djt p³ r n t³j t³ mt.(w)t md³t*
4. *n zh³w p³-nfr-m-dd.t n*
5. *[...] p³ hrw*
6. *m pr n [jb?...]*
7. *jmntt*

Translation:

1. Regnal year 3, month 3 of Akhet, day 28
2. This day, [coming] by the scribe *P³-hm-ntr*
3. giving the spell of seizing the poison scroll
4. to the scribe *P³-nfr-m-dd.t* of [...]
5. [...] today
6. in the house of
7. *Jb-jmntt* [...]

This text explicitly documents the transfer of an individual medical treatment for poison from a scribe outside of the necropolis to one at Deir el-Medina. Further, this transfer was likely overseen and witnessed by an outside party, *Jb-Jmntt*. While one can only speculate exactly why this transfer was made, its documentation suggests that the transfer of medical knowledge—even in small, individual increments—was both valued and carefully monitored.

In addition, a portable medical ostrakon could have been necessary if one needed a list in order to procure its various ingredients. For example, in a personal letter, O. Berlin 11247, a man asks his son to assemble specific ingredients necessary for an eye treatment.⁶⁶ While some of the medical ostraca are incomplete, all have at

⁶⁶ This is translated and discussed in more detail in section 4.7.3.

least a partial list of ingredients present. Other aspects of the medical process, on the other hand, are completely absent from medical ostraca such as the examination. Thus, in ostraca particularly, lists of medical ingredients are frequent and necessary.

Finally, they may have been copied from more extant texts and used to augment an existing archive. The practice of copying between texts is clearly documented between P. Ebers and P. Hearst (Reisner 1905, 3). The two texts not only contain parallel treatments, but even have passages with the same order of the treatments. These usually occur in small clusters (e.g., P. Ebers 243-P. Ebers 247=P. Hearst 71-75). Yet, it is quite clear that these two texts were likely not constructed side-by-side. Both papyri contain sections not found in the other, and some matching treatments are not found in the same order. They were thus likely constructed in discrete segments, each copying other similar texts from both medical papyri and ostraca.

The construction of the P. Chester Beatty papyri, several of which are written in at least two hands, indicate that these texts were not only constructed in multiple instances, but also by multiple individuals. These texts must have thus originated from a variety of other sources accumulated over time. Using the medical ostraca as a means to acquire additional material for these papyri would allow scribes maintaining a medical archive to share segments of one or more treatments. This may, for example, explain why some segments of the Chester Beatty papyri also share the same text as the medical ostraca (e.g., Chester Beatty V, vs. 3.1-3.2 = O. DEM 1213 1-2⁶⁷).

O. DEM 1091 may have been one such ostrakon used to augment an existing medical archive at Deir el-Medina. This ostrakon consists of three different treatments. While the writing is mostly obliterated on the recto, the title can still be reconstructed

⁶⁷ Based on Borghouts (1978, 123).

to read: *phr.t n h^ctj*, ‘A remedy for the heart.’ The more complete verso contains what appear to be two separate additional treatments. First, *gsw n dr h³w*, an ointment for the removal of a *h^cw*-illness.⁶⁸ Second, *dr sr.t m ^cw.t nb.t*, ‘The removal of a *sr.t*-illness from any limb.’⁶⁹ The different purposes of the recto and verso for this ostrakon indicate it was written to address more than one kind of illness. These could have been acquired to treat multiple illnesses simultaneously, or alternatively it could have been acquired to augment treatments for these specific kinds of illnesses. In both scenarios, the choice to treat these specific kinds of illnesses would have been based on the needs at Deir el-Medina. Consequently, the creation and maintenance of both medical papyri and medical ostraca at Deir el-Medina come from an organic need to address those illnesses most pressing in the community, and thus these archives themselves are testaments to the kinds of illnesses most prevalent in the village.

3.7.3 Illnesses attested at Deir el-Medina


If the creation and maintenance of medical texts is customized based on the issues present in a specific group, then what illnesses are most prevalent among the documents at Deir el-Medina, and what does this reflect about the primary health issues faced by the community?

The most prominent illnesses mentioned in medical texts from Deir el-Medina are internal disorders. Chester Beatty 6 contains 41 different legible texts, and at least 32 of them deal with digestive disorders affecting the anus and bladder. These disorders include remedies for removing the *^cn*⁷⁰ “turning around” in the anus and a

⁶⁸ This illness only occurs in this text (Grapow et al. 1961, 583), and is written with the pustule determinative which makes its translation ambiguous.

⁶⁹ Similarly, *sr.t* is otherwise unattested (Grapow, Westerndorf and Deines 1961, 7: 772).

⁷⁰ TLA lemma 850556; Wb 1, 188.13-189.7; Lesko, Dictionary I, 77.

*dns*⁷¹ “heaviness” of the anus. These references suggest an internal ailment, in which there is a blockage. This concept is further corroborated by Chester Beatty 6, #18 (line 6.13): *k.t phr.t n skb ḥ3tj skb ph.yt sꜥnh mtw jrt m trj n šmw*, “Another remedy for cooling the heart, cooling the anus, and enlivening the *mtw*-vessels. One made in the season of summer.” The *mtw* need to be enlivened because they are not pulsing with air and blood due to a blockage. The blocked *mtw* also result in a fever, because the air cannot circulate and therefore the body gets hot, as is mentioned in P. Ebers 855d (Lang 2013, 114). The need to *skbb*,  “cool,”⁷² the body could serve the dual purposes of relieving an individual and purifying them as an act of conceptual ritual cleansing.⁷³ These internal disorders, which manifested through both the digestive system and fevers, were likely some of the primary ailments affecting *Kn-ḥr-ḥpš=f* and his family. These symptoms were likely the products of infectious diseases in the community.

Another set of texts that reoccurred frequently in the Chester Beatty papyri are treatments for poisonous bites and stings. Deir el-Medina’s location, among the unpopulated Western hills of Thebes, would have made it a prime location for scorpion stings and snake bites. This is further corroborated by the number of scorpion stings documented in the absence from work texts (see section 5.8).

Finally, multiple Chester Beatty papyri include amuletic texts and treatments for protections against the dead. The locations of both the village and the workmen’s huts were in the very heart of the Theban mortuary landscape. The necropoleis at Deir el-

⁷¹ TLA lemma 179910; Wb 5, 468.3-469.8.

⁷² TLA lemma 146060; Wb 4, 304.6-305.8.

⁷³ Cooling serves to counteract poison, and thus decontaminate the body as is demonstrated in O. Cairo JE 69771, a religious text for removing poison: *r skbb B mtw.t nšn.tj*, “in order to cool the poison that was raging.”

Medina about the village and would have been visible in daily life. The workman's huts are placed on the top of the Theban hills between the Valley of the Kings, mortuary temples, and the nearby Tombs of the Nobles. By living, working, and walking in the Theban hills, the people of Deir el-Medina were surrounded by not only their dead ancestors, but the dead kings and queens of the New Kingdom—some of the most powerful dead spirits imaginable. Thus, at Deir el-Medina above all other places, men and women would have needed protection from malicious acts from the dead. As causative agents of disease, they would have been a constant priority as reflected in their presence among various Chester Beatty papyri and amuletic texts at Deir el-Medina.

3.7.4 Amulets at Deir el-Medina

Table 3.4 Amuletic medical texts from Deir el-Medina

TEXT NUMBER	DESCRIPTION OF MEDICAL CONTENTS
P. BERLIN P. 15749	Amuletic text protecting against fever (<i>srj</i>)
P. DEM 36	Amuletic text protecting against an illness of three days for Anj-nxt
P. DEM 40	Amuletic text for the protection of qn-Hr-xpS=f son of Hwt-Hr against female and male dead, spirits, enemies, and adversaries
P. DEM 44	Amuletic text offering protections of the woman Taweret against female and male dead, spirits, enemies, and adversaries.

The Chester Beatty papyri are clearly medical texts designed to be part of a handbook that could be consulted for proactive or reactive medical treatments. These texts are therefore designed as references, rather than the treatments themselves. Treatments are difficult to access in the archaeological record as they were generally

applied directly to the body, and thus would leave no material traces. One form of treatment that can be recovered, however, are apotropaic amulets.⁷⁴

Several fragments of such amuletic texts were excavated by Bruyère (Table 3.4), and show the systematic production of these items for medical care at Deir el-Medina (Bruyère 1953, 72; Sauneron 1970, 8-9). These amulets seek protection from several of the same entities mentioned in the *Oracular Amuletic Decrees*, including the dead, the divine, demons, and a disease of three days, but through linking them with known inhabitants of Deir el-Medina, we can further understand their ritual context in terms of how they were used, who used them, and how they were enacted as ritual objects.⁷⁵

P. DEM 36, published by Sauneron (1970) is an amuletic text protecting *3ny-nht*⁷⁶ from a fever of three days. The text was written as a royal decree from Osiris to Geb, asking that he sail to the fields of Yaru and bring with him the male and female *nsy* demons, male and female opponents (*d^c.yw*⁷⁷), and male and female dead. Once these disease agents are taken away, the symptoms of burning (*p3 srf*⁷⁸ and *t3 rmn.t*⁷⁹) would also be removed quickly. The amuletic text was written in conjunction with drawings of two divine barks, two wadjet eyes, and two khepri beetles. Then the papyrus was folded,⁸⁰ and placed on a cord with seven knots which was meant to be worn as a

⁷⁴ Much of my discussion on amulets has been influenced by Jacco Dieleman's research, including his recent presentation on amuletic texts (2014).

⁷⁵ I have identified four amulets from Deir el-Medina that were complete enough for publication. These are P. DeM 36 (Sauneron 1970), P. DeM 40 (Koenig 1981), P. DeM 44 (Koenig 1999), and P. Berlin 15749 (Vandier 1966).

⁷⁶ See Anynakhte (i) (Davies 1999, 75) for a possible identification of this individual with the foreman Anynakhte.

⁷⁷ TLA lemma 181880; Wb 5, 517.10-12.

⁷⁸ TLA lemma 139380; Wb 4, 195.11-13; MedWb 781 f.

⁷⁹ See Quack (2011, 415) for the correction *rmn.t* from *r-hn.t* in Sauneron (1970). For its association with burning, see Edwards (1960a, 20, nt. 16).

⁸⁰ It was folded eight times lengthwise, five times widthwise, and two additional folds from both the right and the left (Bruyère 1953, 72).

necklace (as indicated in line 6). It was written in a fast, cursive hand (Sauneron 1970, 7-8), rather than the more intentional hands used for medical texts in the Chester Beatty Papyri. It also was found discarded in the grand pit.

Within this context, one can see that the amulet was written as a response to a specific illness of *3nj-nht*, and even though it appeared to be short-term (three days), the illness was serious enough to warrant the hasty production of a customized amulet. It calls for divine intervention to remove the disease demons or dead that are contaminating *3nj-nht* immediately, and its placement at the neck in combination with ritual folding and knotting of the papyrus would have simultaneously served to enclose and thus protect the individual. The seven knots would have both sealed and blocked out disease agents from entering the seven orifices of the head (Wendrich 2006). Consequently, while the text serves to remove the cause and symptoms of the disease immediately, the ritual placement of the papyrus as an amulet on a necklace prevents the individual from re-contamination.

This amuletic text of *3nj-nht* was clearly designed to treat one individual instance of disease. Its hasty execution and its treatment of a disease of only three days show that amulets could be used at the onset of an illness as a form of treatment. Its disposal in the grand pit further suggests that it retained no value after this one time use.

P. DEM 40, published by Koenig (1981), is a similar amulet written by another scribe⁸¹ for the use of *Ḳn-ḥr-ḥpš=f: md3.t n.t dr mt mtt ḥft pf.t⁸² dꜥy dꜥyt jj m grḥ m hrw nw nb ntj m ꜥ.wt nb n ḳn-ḥr-[ḥpš=f ms n ḥwt-ḥr]* “A text for driving out a dead man,

⁸¹ Koenig notes that the hand is noticeably different from Qenherkhopeshef’s (1981, 29).

⁸² See footnote in Koenig (1981, 30, nt. b).

dead woman, male enemy, or female enemy, male adversary, or female adversary who comes in the night or in the day, at any moment, who are in any part of the body of Qen-her-[khopeshef, son of Hathor.]” Unlike P. DEM 36, however, this text uses much less specific language. There is no list of symptoms and the text aims to protect the entire body from agents of disease that could come at any time. Further, the text explains the origins of these disease agents as messengers of the divine, thus it is necessary to protect *Ḳn-ḥr-ḥpš=f* from the gods themselves. This text consequently speaks to a much broader ailment than the short term fever of P. DEM 36. Instead, it suggests long-term protection and may have been made in response to longer term illnesses suffered by *Ḳn-ḥr-ḥpš=f*. It is entirely possible that *Ḳn-ḥr-ḥpš=f* would have suffered from such long-term illness given that he was recorded as consecutively absent due to illness from 3 *šmw* 14 to 4 *šmw* 11 of year 3 of Amenmesse, and based on texts from the site, we know he reached an extremely old age.⁸³ Despite the fact that *Ḳn-ḥr-ḥpš=f* had an extensive archive of private medical documents, it was also necessary for him to have this text written for him by another scribe. This suggests that *Ḳn-ḥr-ḥpš=f* required a separate ritual practitioner in order for this amulet to be effective.

These amulets, the medical ostraca, and the Chester Beatty papyri show that both medical knowledge and in some cases treatment would not have been restricted to professional medical practitioners alone. Instead, these would have been accessible to a restricted group of highly literate individuals. Based on the handwriting, the medical portions of the Chester Beatty papyri were compiled and copied by four or more individuals (Gardiner 1935), with more than one author contributing to the same

⁸³ See O. Gardiner 167 as an example.

papyrus in some instances (e.g., Chester Beatty 6). Various members of this family could thus access and add to the medical compendia, even though they may not have had the official title of *swnw*, physician.

An ostrakon documenting the transfer of a spell, P. Geneva MAH 15274 + P. Turin CGT 54063 verso, shows that scribes without a professional medical title could still transfer medical treatments between each other. These scribes apparently did not need someone else to act as a divine intermediary in order to use the text, though based on the fact that P. DEM 40 was not written by *Kn-hr-hpš=f* himself, we can assume that scribes may not have been able to create the texts themselves. Additionally, the fact that the transfer of the recitation was recorded in writing with a witness present may suggest the classified nature of the medical texts and their value.

This exclusive access in both the maintenance and use of medical knowledge would have given the literate an upper hand in their medical care. Even at Deir el-Medina, where medical professionals were expected to provide care to the broader community (chapter four), there was an incentive to invest in private medical documents.

3.8 CONCLUSIONS

This chapter demonstrates that the dominant theory for disease transmission in Egypt was founded upon a concept of contamination, and in turn, medicine aimed to treat contamination through removing and protecting individuals from harmful disease causing agents. This may not be the only theory for disease transmission, but it reflects a form of logic that could be applied to a variety of illnesses ranging from poisonous stings to digestive issues. While medical knowledge was maintained in large

and comprehensive archives, actual treatments were customized to the infected individual, and thus in situations where professional medical care was limited or unavailable, the literate had nearly exclusive direct access to medical treatment in Egypt.

At Deir el-Medina, these kinds of medical archives were maintained to address the specific needs of the community, reflecting the real concerns individuals at Deir el-Medina had with infectious disease, poisonous stings, and attacks from the dead.

These issues would have obviously plagued the community as a whole, so how were sick individuals actually treated? Who treated the sick when they did not have access to these “private” medical documents? My next chapter addresses these questions through analysis of the professional medical practitioners and private caretakers in the village. Through personal letters and administrative archives, I reconstruct the health care networks available at the site in order to explore how social and professional status could have impacted access to “public” health care at Deir el-Medina.

4 HEALTH CARE NETWORKS AT DEIR EL-MEDINA

The previous chapter demonstrated that an emic Egyptian theory of disease transmission was founded on the idea of contamination, and consequently Egyptian medicine was designed to remove these contaminants and purify the patient. The presence of both preventative and reactive medical texts in private collections at Deir el-Medina further demonstrated that individuals within the village had access to knowledge about medical care and practiced medicine. Yet there are several questions left unanswered about how medicine and health care were structured at Deir el-Medina. What constituted popular, folk, and professional sectors of health care in the village? How were these different sectors compensated? How does someone's social and professional status change their access to health care and their networks of support?

In this chapter, I address these questions not only to document the structure of health care at Deir el-Medina, but also to explore how that structure can shift based on the context of the individual. First, I trace the texts which mention the three primary folk and professional medical practitioners at the site: the *swnw*, *hrp-Srk.t*, and *rh.t*. These texts allow us to consider who was eligible for these positions, how they were compensated, and what kind of care they provided. Then, I explore which members of the community had access to both medical knowledge and care from these practitioners.

Second, I discuss texts that reference the provisioning of assistance and sustenance to support someone's recovery from illness. While taking care of the sick was not professionalized, it was still a process structured by community expectations

and thus constituted popular care. I demonstrate through texts relating to caretaking and neglect the underlying cultural expectations to provide care for family members and the social consequences for those who neglected them.

This analysis of texts relating to professional medical practitioners and private caretakers enables us to see how differences in state-structured support as well as family support can impact health care networks and thus lead to systematic differences in health status. Overall, it is evident that the entire village of Deir el-Medina had unique access to health care through financial support from the state which would have given them a much more comprehensive health care network than other communities without state support. At the same time, these health care networks were not universally accessible across the village. The most elite members of the community likely also had the ability to arrange both medical and personal care privately, and thus would have had the best tools to combat illness.

4.1 PROFESSIONAL, FOLK, AND POPULAR CARE SECTORS AT DEIR EL-MEDINA

The people of Deir el-Medina left no document defining a difference between professional, folk, and popular care,⁸⁴ yet these sectors can still be delineated based on their titles and availability. First, professional practitioners have titles related to their roles in the process of examining, diagnosing, and treating patients. Second, these professionals were available to the broader community, rather than to individual workmen and their families. In opposition, providers of popular care were not given titles related to their responsibilities and their availability for others was based on personal relationships; caretakers would only be sought out by family members or

⁸⁴ See chapter two for definitions of popular, folk, and professional care.

close friends, rather than any member of the community. Providers specializing in folk care sit between these two sectors. While they were available to the broader community, their titles and primary responsibilities may not be specific to healing. Health care at Deir el-Medina required a combination of these roles to diagnose and treat the ill.

4.2 PROFESSIONAL AND FOLK MEDICAL PRACTITIONERS

The medical texts demonstrate that several different titles were associated with medical care. This is clearest in P. Ebers 854a, when the text calls for “any *swnw*, any *w^cb* priest of Sekhmet, any *s3w*” (99.2-99.3). While earlier scholars have suggested that the use of these different titles illustrates the differentiation between magic and medicine (Maspero 1893, 302), Gardiner pointed out already in 1917 that various individuals contain a combination of titles associated with both “magical” and “medical” care (1917), and Allen suggests that the differentiation by title between “magicians” and “doctors” is now largely anachronistic (2005, 102).⁸⁵ This clearly indicates that one individual could have the knowledge and experience to act as a *swnw* or a *s3w*, and that there is no inherent need to separate the kinds of treatment each would provide.

Based on my criteria for folk and professional medical providers, I identified three titles that offered health care to the broader community at Deir el-Medina: the *swnw*, *hrp-srk.t*, and *rh.t*. The following discussion elucidates the payments to these individuals and their roles in the medical process. I follow my description of these folk

⁸⁵ See the previous chapter for further information on the arbitrary differentiation between magic and medicine. For more information on how the boundaries between these professional titles is both blurred and arbitrary, see Halioua, Ziskind, and DeBevoise (2005, 11-12).

and professional medical practitioners with discussion about the titles *s3w* and *wꜥb* priest of *Shm.t*, both conspicuously absent from the site. I also examine why midwives are noticeably absent in general in Egyptian texts, and consider what this reflects about medical care for women during pregnancy and child birth.

4.2.1 *Swnw*

The primary professional caretaker at Deir el-Medina was the *swnw*. This title was in use throughout Pharaonic history,⁸⁶ and has generally been translated as “doctor” or “physician” based on its association with healing and medicine (Ghalioungui 1983; Halioua et al. 2005; Jonckheere 1958; Nunn 1996). In the Old Kingdom, there were many different hierarchical positions for a variety of *swnw*, though, as with most titles, we see a general drop by the New Kingdom when the title only had two classes: *wr swnw*, chief physician, or simply *swnw* (Ghalioungui 1983, 73). There were also numerous specialists in the Old Kingdom, with *swnw* of the eyes, teeth, anus, abdomen, and veterinary surgery. These specialist titles almost completely disappear in all other periods as well (Ghalioungui 1983, 73).

The specific medical responsibilities of the *swnw* are addressed in several passages of the medical texts. They were associated with the applications of topical remedies and prescriptions, usually denoted as *phr.t* or *zpw*. Multiple passages within P. Ebers—which was written for multiple medical professionals—indicate that the *swnw* were particularly knowledgeable about these remedies. The title of P. Ebers 156 suggests that these remedies were a specialty of the *swnw*: *phr.t nt skbb hm.t swnw*, “a

⁸⁶ An initial catalog of individuals with the title *swnw* was published by Jonckheere (1958). This was then expanded upon by other scholars and included in a tabulated compendium by Nunn (1996, 211-214).

remedy for cooling, craft of the *swnw*” (33.4). Further, P. Ebers 188 and P. Ebers 206 both suggest that the *swnw* specifically possessed the knowledge necessary to compose these remedies: *Jr.hr=k zp n zšt3 nsm.yt jr w swnw*, “Then you should make an herbal remedy which the *swnw* makes” (P. Ebers 188, 36.10); *Jr.hr=k n=f zpw nw st3 r hr swnw*, “Then you should make for him a remedy which is a secret in possession of the *swnw*” (P. Ebers 206, 42.6).

The association of the *swnw* with collections of medical texts is clear from the opening lines of the Ebers papyrus (P. Ebers 1):⁸⁷ *Jw=f di=f mdw drf jr=f dmd.t di=f 3h n rhw-h.t n swnw*, “He (Thoth) is the one who caused writing to be spoken, he makes a collection, he gives efficacy to the knowledgeable,⁸⁸ to the *swnw*” (1.8-1.9). This text also alludes to the efficacy of the spoken word in medicine, and implies a connection between recitation treatments and the *swnw*. Finally, the *swnw* is mentioned in cases involving surgical procedures (P. Ebers 501, 69.9) and bandaging wounds (P. Edwin Smith 9, 5.4). Consequently, the *swnw* is linked with all different layers of the medical process from examination to treatment as well as the variety of treatment protocols in medicine including remedies, recitations, and surgery. This evidence does suggest, however, that the *swnw* specialized in responsive or reactive medicine, only treating the individual who has come to him with an ailment.

⁸⁷ A parallel passage exists in P. Hearst 78 (6, 9-10).

⁸⁸ Literally translated as “the one who knows things,” which Ritner takes to indicate secret and sacred knowledge with specifically religious and magical overtones (2008, 229-230)

4.2.2 Texts referencing the *swnw* at Deir el-Medina

In the Deir el-Medina Database, there are 24 texts relating to the title *swnw* (Table 4.1). The vast majority of these are grain ration texts (n=14). Of those remaining texts, three are too fragmentary for analysis. This leaves only seven texts explicitly mentioning the *swnw* with contents we can reconstruct beyond grain rations. Four of these letters mention items given to the *swnw*, two are absence from work texts,⁸⁹ and one is part of a legal accusation.

Table 4.1 Texts relating to the *swnw*

Texts from Deir el-Medina relating to the <i>swnw</i>		
Accession Number	Summary of contents	Date
O. Ashmolean 170	Items given to a <i>swnw</i>	Unknown
O. Ashmolean 184	Grain rations	Dyn 19
O. Berlin P 14254	Grain rations	Late Dyn 19
O. Berlin P 14264	Grain rations	Mid Dyn 20
O. BM 5634	Absence from work	Dyn 19 (Year 40, Ramses II)
O. Cairo CG 25608	Grain rations	Mid Dyn 20
O. Cairo JE 72455	Grain rations	Unknown
O. DEM 149	Grain rations	Dyn 20 (Ramesses III)
O. DEM 376	Grain rations	Late Dyn 19
O. DEM 617	Absence from work	Dyn 20 (Ramesses IV)
O. DEM 662	Too fragmentary	Dyn 20 (Year 19, Ramesses III)
O. DEM 788	Items given to a <i>swnw</i>	Dyn 20 (Ramesses III)
O. DEM 790	Too fragmentary	Dyn 20 (Ramesses III)
O. DEM 973	Items given to a <i>swnw</i>	Dyn 20 (Ramesses III)
O. OIM 16973	Part of a legal accusation	Dyn 20
P. BM 9997	Grain rations	Dyn 20 (Year 14, Ramesses XI)
P. Turin Cat 1880	Items given to a <i>swnw</i>	Dyn 20 (Year 29, Ramesses III)
P. Turin Cat 1884 + 2067 + 2071 + 2105	Grain rations	Dyn 20 (Year 15, Ramesses IX)
P. Turin Cat 1929	Grain rations	Unknown
P. Turin Cat 1960 + 2071	Too fragmentary	Dyn 20 (Year 14, Ramesses IX)
P. Turin Cat 2018	Grain rations	Dyn 20 (Year 10, Ramesses XI)
P. Turin Cat 2062	Grain rations	Dyn 20 (Year 2, Ramesses V)
P. Turin Cat 2081 + 2095	Grain rations	Dyn 20 (Year 2, Ramesses V)
P. Turin Cat 2097 + 2105	Grain rations	Dyn 20 (Year 2, Ramesses XI)

⁸⁹ O. BM 5634 is included in this list, under the assumption that *P3-hrj-pd.t* was the village *swnw* during year 40 of Ramesses II. This is discussed in more detail below.

4.2.3 State and Private Payments to the *swnw*

These texts demonstrate that the services of the *swnw* and his expertise were fiscally supported by the Egyptian state through supplementary rations, excused days off work, and the use of an assistant. Grain rations mentioning the *swnw* indicate that he was generally given a much smaller payment than that offered to workmen, the scribe, or the foremen; however, Janssen has interpreted this as an additional payment on top of a pre-existing salary as a workman (1975, 460), thus making the pay for the *swnw* only slightly less than that for the foreman. The absence from work texts show that time was clearly allotted for the *swnw* to prepare medicines and medical treatment. In some cases, he was even allowed the use of another workman to assist with producing these remedies (e.g., Khonsu in O. BM 5634).⁹⁰ The *swnw* was thus compensated through both supplementary governmental rations and resources from the state for his services.

Compensation for the work of the *swnw* may not have been exclusively from the state, however, as additional texts mention items privately delivered to the *swnw*. These unfortunately often lack information about why and from whom the items were being distributed, such as in O. DEM 788, in which the *swnw* *Knr* receives sesame oil (*nḥḥ*) and fat (*ḥd*) from an unknown sender. These items could have been part of a normal distribution to the workforce, in which case the payment would still have been made by the government. The presence of administrative records documenting the

⁹⁰ The assistant could have also been in an apprenticeship to become a *swnw*, though the lack of references to the names of individuals with this title makes this impossible to test.

distribution of sesame oil (e.g., P. Turin 1894) and fat (e.g., P. Turin Cat 2044, recto 3.9) support this point. Alternatively, these could have been a form of previously agreed upon private payment from an individual to the *swnw*.⁹¹ The sesame oil and fat also could have been a transaction between the *swnw* and the sender based on a separate agreement, unrelated to medicine. As a final alternative, these could have been given to the *swnw* to be used for medical purposes, perhaps because the sender required the *swnw* to use these to treat himself/herself, or a sick friend or relative. The use of fat (*ꜥd*) in medical texts is well attested (Grapow et al. 1959, 112-121), though the use of sesame oil (*nhḥ*) is relatively rare (Grapow et al. 1959, 311).

One text, P. Turin Cat. 1880, offers clear evidence for private payments to the *swnw* (published in Gardiner 1948, 47-48). The *swnw* is allocated a variety of items from *Wsr-ḥꜥt* which total to 20 deben.⁹² The *mn.t*, “wet nurse,”⁹³ is then given a variety of items as well.⁹⁴ After these two distributions are detailed, the text continues with an oath made in front of the *knb.t*, court (verso 6.4- 6.5):

w3ḥ jmn w3ḥ p3 ḥk3 ꜥ.w.s bn j.jn.tw t3y=j 3
ḥrd.w ḥr.r=j bn j.jn.tw=j ḥr.r=w

“As Amun endures and as the king, L.P.H., endures, my three daughters shall not be taken from me and I shall not be taken from them.”⁹⁵

⁹¹ The use of *nk.t* in this text instead of a specified amount suggests that, if used as payment, the amount of oil and fat were already known to the doctor and did not need to be specified.

⁹² While in verso 5.12, the total given is 22 deben, the actual sum of the items is 19 ½ deben and the final total given in verso 5.20 is 20 deben.

⁹³ TLA lemma 95140; Wb 2, 436.16-437.2.

⁹⁴ The total value of the items for the wet nurse is first given as 30 ½ deben. The final total for both her payment and the doctor’s suggests she was only given 10 deben, as the cumulative total is given as 30 deben (subtracting 20 for the doctor) on verso 5.20.

⁹⁵ Emphasis implied through the use of the negated, passive emphatic form *bn j.sdm.tw=f*, though the discontinuous morpheme (*jn/jwn3*) appears to be dropped (Junge 2005, 130).

The nature of these payments seems to be related to *Wsr-h̄t*'s oath, and McDowell has suggested that, "it is perhaps not too fanciful to conjecture that Weser-hat's wife had died in childbirth, leaving the widower to care for their three children" (1999, 36).

It is difficult to determine why, in this solitary instance, *Wsr-h̄t* was required to make payments. Genealogical information is currently impossible to trace for *Wsr-h̄t*, as Davies identifies at least nine individuals with this name, several living during this time period, and unfortunately misconstrues the identity of *Wsr-h̄t* in this particular text (1999, 43).⁹⁶ Consequently, we cannot ascertain whether or not he was a workman or even part of the community. If he was not an official member of the community, he may have been required to make a private payment.

The payment for the *swnw* was equal to slightly less than two months' grain rations.⁹⁷ While some scholars have conjectured that this payment to the *swnw* represents a very high sum (Lesko 1994, 21), the lack of supplementary information makes it impossible to determine what kind of services were included in this payment. If we assume that this payment represents work conducted by the *swnw* over the span of several months, which is not unreasonable given the simultaneous payment of a wet nurse who would presumably need to be paid for multiple months' labor, then the expense could have represented the sum of many hours labor. Regardless, this demonstrates private payments made to the *swnw* for his work, suggesting that either

⁹⁶ Davies suggests that the *swnw* in this text is named *Wsr-h̄t*, referencing RAD 47.15. He unfortunately misses the preposition "jn," which denotes the payment was to the physician *by Wsr-h̄t*, rather than to the physician, *Wsr-h̄t*.

⁹⁷ If we assume that one *h̄r* of grain equates to two deben for this text (Janssen, *Commodity Prices*, 124), and that workmen were paid a total of 5 ½ *h̄r* in grain rations per month (Janssen, *Commodity Prices*, 460; Černý, *Prices and Wages*, 917).

the *swnw* could be paid for services that were somehow above and beyond his normal duties or for services rendered to an individual outside of the workmen's community.

4.2.4 Duration of Services by the *swnw*

The above text brings to light one important issue: how long did the services of the *swnw* last for one individual? O. OIM 16973 suggests that the *swnw* could spend multiple months treating one patient.⁹⁸ According to Janssen, this document contains charges against (*sh3-r*⁹⁹) a workman who was away (*w3w*¹⁰⁰) for five months because his wife was with the *swnw*. Janssen speculates that, "The unknown workman did not turn up at work, being out of himself because his wife had eloped with another workman who acted as the doctor" (1997, 91). Such a sensational explanation does not have much basis in the simple text nor does it explain why the man was referred to as *swnw*, rather than being named as the adulterer.¹⁰¹ A more pragmatic explanation would be that the workman chose to remain absent from work in order to take care of his sick wife, even though the *swnw* was already attending her. His absence was deemed unacceptable, yet somehow he was able to stay away from work for five months. This not only reflects the seriousness of her illness, but also the social ambiguity behind his absence. If it was completely unacceptable, one would expect he would have been punished and forced to return to work much sooner. Given the delay, this accusation

⁹⁸ Partially published by Janssen (1997, 91) and Toivari-Viitala (Toivari-Viitala 2001, 214). Neither of these publications offer a transliteration of the text or a full translation, as both just provide us with lines 1-2.

⁹⁹ TLA lemma 134820; Wb 4, 127.7-128.13; Lesko, Dictionary III, 83.

¹⁰⁰ TLA lemma 42550; Wb 1, 245.3-13.

¹⁰¹ Other cases of adultery directly name the adulterer (e.g., O. Ashmolean 186; P. BM 10055; P. BM 10416).

could have come at the heels of other social and professional pressures, such as an unsatisfactory report on tomb progress or a complaint filed by a fellow workman.¹⁰²

Ironically, the text that gives us the most insight into the *swnw* treating others at Deir el-Medina does not explicitly use the term *swnw*. O. BM 5634 contains several absences by the workman *P3-ḥrj-pd.t* related to caretaking and the production of medicine, though he is never given the title *swnw* nor is this title ever attributed to him in other texts.¹⁰³ Nonetheless, scholars have assumed *P3-ḥrj-pd.t* was the village *swnw* based on the caretaking and the preparation of medicine (*pḥr.t*) as reasons for absences from work (Janssen 1980). His longest absence for preparing medicine is from I *šmw* 25 to II *šmw* 8, a period of 13 days, in order to prepare remedies for the scribe's wife. This extended absence may have been necessary if ingredients for the remedies were outside of the community, or if *P3-ḥrj-pd.t* had to consult medical compendia unavailable at Deir el-Medina. His shorter absences on III *šmw* 3 and III *prt* 25-27 show that in some cases, remedies could be prepared in a day or two.¹⁰⁴

In O. BM 5634, *P3-ḥrj-pd.t* was also absent to take care of sick colleagues and prepare medicine. He was absent from III *ḫt* 21 to 4 *ḫt* 17, nearly an entire month, to take care of *ʿ3-pḥtj*, who was sick at this time. Simultaneously, there were numerous times when workmen were sick for extended periods, and *P3-ḥrj-pd.t* was not a caretaker. Other workmen could be out in order to take care of sick colleagues and

¹⁰² Both complaints filed against individual workmen (e.g., O. BM EA 66408) and inspection reports (e.g., O. Florence 2621) have been documented among the texts from Deir el-Medina.

¹⁰³ No other published texts link *P3-ḥr-pd.t* with the title *swnw*. The following unpublished texts require further examination: O. IFAO 181, O. IFAO 449, O. IFAO 488, O. IFAO 901, O. IFAO 1461, O. IFAO 1467.

¹⁰⁴ In both of these examples, he prepares the remedies with his fellow workman *Hnsw*.

family members for shorter periods such as *Pn-nbw* who was taking care of his sick mother on IV Peret 24-25.

4.2.5 Patients of the *swnw*

The above texts demonstrate that the government paid for services from the *swnw* to treat both the workmen and their wives. The payment made in P. Turin Cat. 1880, however, indicates that in specific situations, the burden was on the individual. Given that grain ration texts are present during the same period as this document, it is likely that the services provided by the *swnw* extended beyond what was deemed reasonable. It is possible that this particular *Wsr-h^ct* was not a workman at all, as several individuals with this name are mentioned without titles relating to the workforce (Davies 1999, 42).

Consequently, the *swnw* could serve patients outside of those intended by the government under the condition that he receive private payment. The practice of using one's specialized skills and even work days for private commissions was common at Deir el-Medina, and well attested in the commissioning of private funerary arts (Cooney 2007). Even though the *swnw* was paid only a supplementary ration, his title and status may have afforded him additional profitable opportunities outside of the village. Thus, these private payments would have likely increased his total income from his role as a *swnw*, and reflect the advantages members of the community had in general to receive care without payment.

4.2.6 Individuals Identified as the *swnw* at Deir el-Medina

At Deir el-Medina, Janssen has identified five individuals with the title *swnw*: *P3-hrj-pd.t* (O. BM 5634), *P^cy-n* (O. DEM 617), *Knr* (O. DEM 788), *Hrj-st-jt=f* (P. Turin Cat.

1960 and 2071), and *Mn-h3w* (P. Turin Cat. 2018). It was typical to identify the *swnw* without name, and even among these five instances, not all are explicitly given this title. Despite these difficulties in identifying individuals as *swnw*, texts referencing these five *swnw* date to periods that span from the reign of Ramesses II until the end of the occupation at Deir el-Medina during the reign of Ramesses XI, with no clear overlap between individuals. Based on this information and ration texts, there would have only been one person appointed at a time as the village *swnw*.

This *swnw* was likely appointed from among the existing workforce given their supplementary rations and the fact the *P3-hrj-pd.t* was a workman.¹⁰⁵ The previous chapter describes how literate a *swnw* must have been in order to use and acquire the necessary medical texts. Consequently, it may have been an attractive alternative to other exclusive positions for the literate such as the scribe.

4.3 THE SCORPION CHARMER

The title *hrp-Srk.t* is less common than *swnw*, though it is still associated with medical care and likely also constitutes part of professional medical care. Gardiner identified this title fourteen times throughout Egyptian history, two of which simultaneously use the title *swnw* (1917, 34–44). The title literally means “the controller of Serqet” and refers to the goddess Serqet, who is represented by a scorpion (𓏏). It is thus a religiously charged title, which carries with it connotations of protection against scorpions and potentially similar disease agents such as poisonous snakes. Consequently, this title is often translated as “scorpion charmer” to

¹⁰⁵ Unfortunately, it is difficult to determine whether the other *swnw* were also workmen given the reuse of names at the site.

address this individual's role in protecting against scorpions and other harmful creatures.

The position appeared to go beyond just protecting against scorpions. In a detailed discussion of texts mentioning the *hrp-Srk.t*, Gardiner evaluates the healing and other responsibilities associated with the title (1917). He demonstrates—mostly through texts from Deir el-Medina—that the *hrp-Srk.t* would have specialized in medical treatments related to poisonous bites and stings, but may have also acted as an intermediary with the deities.

4.3.1 Texts with the Title of the Scorpion Charmer

The title *hrp-Srk.t* occurs in 11 texts from Deir el-Medina (Table 4.2). Similar to the *swnw*, the majority of these texts relate to grain or supplementary rations. Only two texts discuss the role of the *hrp-Srk.t* in more detail. Unlike the *swnw*, texts relating to the *hrp-Srk.t* date exclusively to the 20th dynasty; the earliest references to the *hrp-Srk.t* appear in the reign of Ramesses III.¹⁰⁶ This may explain the fact that we find relatively fewer texts referencing the *hrp-Srk.t* than the *swnw*, but requires further analysis to understand why a *hrp-Srk.t* does not appear in earlier texts from the 19th dynasty, while the *swnw* does.

Table 4.2 Texts relating to the *hrp-Srk.t*

Texts from Deir el-Medina relating to the <i>hrp-Srk.t</i>		
Accession Number	Summary of contents	Date
O. Ashmolean 4	Divine intermediary in legal accusation	Dyn 20 (Year 5, Ramesses IV)
O. Ashmolean 21	Grain rations	Unknown
O. Berlin P 11249	Grain rations	Dyn 20

¹⁰⁶ Dates for these texts based on information in the Deir el-Medina database (Borghouts et al. 1998)

O. Cairo CG 25660 + JE 37649	Vegetable rations	Dyn 20 (Ramesses IV)
O. DEM 200	Beer rations	Dyn 20 (Ramesses III)
O. DEM 388	Grain and beer rations	Dyn 20
O. DEM 10045	Too fragmentary	Dyn 20 (Ramesses III, year 16)
O. Toronto ROM 906.20.6	Vinegar rations	Dyn 20 (Ramesses IV or V)
O. UCL 3/ O. UC 31933	Request for medical ingredients	Early to mid Dyn 20*
P. Turin Cat 1929	Name list (possible for rations)	Unknown
P. Turin Cat 2062	Grain rations	Dyn 20 (Year 2, Ramesses V)*

*Kitchen dates this to the reign of Ramesses II. This date is unlikely, however, as the mention of Ramesses II is in the context of his mortuary temple and the *hrp-Srk.t* mentioned, *Jmn-ms*, is dated to Year 5, Ramesses IV in O. Ashmolean 4

4.3.2 Payment of the Scorpion Charmer

The amounts allocated to the *hrp-Srk.t* are the same as those for the *swnw*, which suggests they are also a supplementary wage to be added to a workman's standard wage. P. Turin Cat. 2062 mentions the *hrp-Srk.t* and the *swnw* simultaneously, also demonstrating that these positions would have existed at the village concurrently.

It is interesting to note that while state rations for the *swnw* are exclusively grain, the *hrp-Srk.t* receives a variety of rations including beer, vegetables, and vinegar. These rations were in many cases distributed by the temples (Janssen 1975, 458), and may suggest that while the position of *swnw* was consistently compensated through state government rations, that of the *hrp-Srk.t* was subsidized by state religious institutions. Consequently, while the *swnw* was a regular position in the workforce, with monthly payments documented throughout the Ramesside period, the *hrp-Srk.t* may have been a sporadic position with irregular payments made on an ad-hoc basis. This may also explain why texts relating to the *hrp-Srk.t* are only from the 20th dynasty. Earlier 19th dynasty administrative texts tend to have more detailed accounting (Toivari-Viitala 2006), and thus are more likely to contain the regular, standardized

payments from the state. This is exemplified by the distribution of texts for the *swnw*; all of the texts explicitly naming the *swnw* from the 19th dynasty are grain ration documents.














































4.3.3 Responsibilities of the Scorpion Charmer

Only two texts referring to the *hrp-Srk.t* offer further insight, and both have to do with the only identifiable *hrp-Srk.t* from the village, *Jmn-ms*. In O. UCL 3/O. UC 31933, *Jmn-ms* writes to request several items for a sick priest: *p3 jt-ntr mr wnn t3y=j šc 3pr [...]jw dit jn.tw n'f w^c npy w^c ds hwwy w^c bnr hb*¹⁰⁷, “The god’s father is sick. As soon as my letter reaches [you], you shall cause that one bring to him one grain, one jar of syrup,¹⁰⁸ and one festival date juice” (O. UCL 3, recto 5 through verso 2). In this context, the *hrp-Srk.t* is prescribing treatment for an individual, though we do not have enough context to understand the nature of the illness other than to say that the priest is sick.¹⁰⁹

The second text, O. Ashmolean 4, mentions the *hrp-Srk.t* in a capacity unrelated to medicine. Here, the chisel-bearer *K3h3* uses the *hrp-Srk.t Jmn-ms* as an intermediary to communicate with the deified Amenhotep I during a public accusation against the daughter of the scribe *Jmn-nht*. The fact that the *hrp-Srk.t* would have been used in this capacity, while the *swnw* is never shown as a divine intermediary, suggests the *hrp-Srk.t* had more specialized knowledge to do with divine forces, which underscores

¹⁰⁷ A balanced sentence with *wnn* (see Junge 2005, 272-3).

¹⁰⁸ For full information about the translation “jar of syrup,” see further discussion by Gunn (1955, 94, note 3).

¹⁰⁹ *mr*, though it is interesting to note that here it is written with the dead man determinative,                                             

his ability to treat patients suffering from stings and bites. Additionally, the *hrp-Srk.t* may have been sought for preventative medicine as someone with access to protective spells to be made and worn as amulets, such as those found at Deir el-Medina.¹¹⁰ This preventative style of medicine would also be logically related to divine intervention, in this case, intervening to prevent poison from contaminating the body.

4.4 THE WISE WOMAN

The wise woman, *t3 rh.t*, also acted as a divine intermediary at Deir el-Medina. Her role in the community has been addressed most thoroughly in an article by Karl (2000). Karl demonstrates that the wise woman was used as an intermediary in order to determine the source of divine intervention in private affairs. Often, her services are specifically required because an individual is unaware of the wrong they committed or to whom they should supplicate.

4.4.1 Texts referencing the Wise Woman at Deir el-Medina

Previous studies by Karl (2000) and Toivari-Viitala (2001, 228–231) have identified six texts mentioning the wise woman from Deir el-Medina (Table 4.3). All of these texts call for an individual to go to the wise woman in order to identify how a recent incident was influenced by various *b3.w*—aspects of the divine representing both their power and their visible manifestations (Assmann 2001, 239–240).

¹¹⁰ For further discussion on amulets at Deir el-Medina, see the previous chapter.

Table 4.3 Texts relating to the Wise Woman

Texts from Deir el-Medina relating to the wise woman		
Accession Number	Summary of contents	Date
O. Cairo CG 25674	Text is broken but mentions the <i>b3.w</i> of Nemti and Taweret	Dyn 19 or 20
O. DEM 1688	Divine intermediary to determine the <i>b3.w</i> affecting the eyes of a woman	Dyn 19 or 20
O. DEM 1690	Man is urged to seek out a wise woman about the <i>b3.w</i> affecting the eyes of his wife	Dyn 19 or 20
O. Gardiner 149	Divine intermediary to determine the <i>b3.w</i> affecting the woman	Unknown
O. Letellier	<i>Ḳn-ḥr-ḥpš=f</i> requests a woman to see the wise woman to understand the deaths of two youths	Late Dyn 19
O. Nelson 8/ O. OIM 16974	Two children mentioned in reference to the wise woman. This may relate to O. Letellier	Late Dyn 19

4.4.2 The Wise Woman as a Folk Practitioner

The text which most clearly addresses the wise woman's role in treating illness is O. DEM 1690 (Karl 2000, 134-135; Mathieu 1993, 335-336; Toivari-Viitala 2001, 229). In this text, a man is told to consult with the wise woman about the *b3.w* that are presumably causing a woman's blindness. While in some of the other texts, the authors appear not to know which *b3.w* are affecting an individual, in this text, the author specifically mentions the *b3.w* of Tawaret. The objective, in this case, appears to be to consult the wise woman about what to do, even when the *b3.w* are known.

Karl (2000, 159) specifically addresses how, in a case like O. DEM 1690, the wise woman would have acted as a medical practitioner:

In diesem Kontext mag die Bezeichnung Seherin bzw. Heilerin für sie gelten, wobei Sehen und Heilen die zwei Seiten einer Medaille sind: indem sie sah, d.h. erkannte, diagnostizierte, gab sie die Voraussetzung für die Heilung. Heilung bedeutete aber in diesem Falle die wiedererlangte Harmonie mit den Göttern und den Mitmenschen, indem sie den Betroffenen die Voraussetzung an die

Hand gab, die Götter zu besänftigen und den Zustand von Ordnung, d.h. maat wiederzuerlangen, wenn sie die Namen von involvierten Gottheiten nannte und die Gründe für deren Manifestation.

Karl thus suggests that the wise woman is both a “seer” and “healer.” She intervenes at the beginning of the medical process, namely at the point of diagnosis, through her knowledge of the divine source of an individual’s problems. She then prescribes treatment for the patient so that they themselves can restore *maat*, and thus heal. Her specialist knowledge of divine forces allows her to intervene in the medical process in general, though individuals may not primarily seek this expertise simply for healing, fitting her into the role of a folk practitioner.

Borghouts has used the Metternich Stela to nuance the wise woman’s position as a healer (1982, 26). In this text, dating to the 30th dynasty, Isis consults a wise woman about Horus, who has fallen ill. The wise woman determines the divine forces involved and then recommends Isis, “seek for the reasons (*sp*) why this happened.” Ultimately, however, it is Thoth who cures Horus. In this mythological precedent, the wise woman again serves to diagnose the individual, but does not actually treat Horus. Consequently, while she is engaged in the medical process, her services are more focused on understanding the etiology of illness, rather than treatment.

While the wise woman’s knowledge of the divine can assist in diagnosis, so too can her ability to communicate with the spirits of the dead. This can be tentatively reconstructed in O. DEM 1688:¹¹¹ *tw=j hn n t3 rh.t n mwt jw P3-šdw pr n=j jw=f dd n=j b3.w n Pth ꞥnh mw[t]*, “I went to the wise woman because of the death and *P3-šdw* came to me and said to me, “{It is} the *b3.w* of Ptah. The dead live.” This enigmatic text

¹¹¹ Based on the transliteration and commentary provided by Karl (2000, 135–136) and Toivari-Viitala (2001, 229).

suggests that there was a death for which the author needed more information. *P3-šdw*, here a personal name, may refer to the dead individual himself who communicates through the wise woman to tell the author that his death was because of the manifestations of Ptah.

The need to access the wise woman after a death occurs as well in O. Letellier,¹¹² when *Kn-hr-hpš=f* requests a woman go to the wise woman after the death of two boys:

Transliteration:

1. *dd knn-hpš{=f}¹¹³ n j[n]r-w[3w] y3 jh p3y.t*
2. *tm.t šmt n t3 rh{.t} hr p3 ʿdd 2 jr mwt*
3. *m-dj hnw=t ndnd m-dj t3 rh{.t} hr p3 mwt jr w*
4. *p3 ʿdd 2 n p3y=w š3.yt n t3y=w rnn.t*
5. *mtw=t ndnd n=j mtw=t ptrj n ʿnh jnk*
6. *[n] ʿnh n t3=w mw.t jr p3 ntr nb ntj jw=tw {dd} n=t*
7. *[m-h]t jw=t h3b n=j hr rn=f*
8. *[...] [jrt h]nw n wʿ{.t} rh hnw=s*

Translation:

1. That which *Kn-hr-hpš=f* said to *Jnr-wʿw*: Hey! What is your
2. never going to the wise woman about the two youths who died
3. in your charge? Consult with the wise woman about the deaths of
4. the two youths: was it their destinies or their fortune?
5. You should inquire for me and you should see my life and
6. their mother's life. As to any of the gods who are {mentioned}¹¹⁴ to you afterwards,
7. you should write to me about his name.
8. [...] fulfill the orders of one who knows her commands.

Interestingly, he not only asks that this woman inquire about these deaths, but also inquire on his behalf and on behalf of the boys' mother in order to see 'their lives.' He

¹¹² Published originally by Letellier (1980). Transliteration based on KRI VII 257-258. Translation based on additional published commentary (Karl 2000, 134) and English translations (McDowell 1999, 114-115; Wenté 1990, 141-142). O. Nelson 8 also references consulting the wise woman about two youths, and may be linked to the deaths mentioned in O. Letellier (Sweeney 2014, 527, note 7).

¹¹³ McDowell, Letellier, Karl, and Wenté agree that this is a misspelling of *Kn-hr-hpš=f*.

¹¹⁴ "Mentioned" (*dd*) is supplied by both Wenté and McDowell, and so included here.

tells this woman to write to him about the identities of the gods related to the deaths of these children, indicating that he needed to appease the *b3.w* in fear of potential continued retributions against his life and the mother's. The wise woman thus serves to resolve the deaths of these two youths, while also providing information for the future protection of *Kn-hr-hpš=f* and their mother.

4.4.3 The Wise Woman's Relationship to the Community at Deir el-Medina

Whether or not the wise woman was part of the village community remains speculative. Texts mentioning *t3 rh.t* specify that individuals should go to her, suggesting she was located outside the village.¹¹⁵ No texts explicitly mention paying the wise woman, and she did not appear in ration distributions. It is possible that the small corpus of texts identified above would not have included payment because they are mainly communications between individuals about the wise woman, rather than direct communications with the wise woman which may include written agreement for payment. It therefore remains to be seen how or how much she may have been compensated for her services, though it is clear that she was not paid through rations from the state.

Additionally, none of these texts contain a personal name written in conjunction with the title *t3 rh.t*. It is also of note that in O. DEM 1690, the author uses the indefinite article, requesting the recipient see *a* wise woman (*w^c.t rh.t*). This suggests there may be more than one woman with this title. The Metternich Stele, which dates to the 30th dynasty, refers to Isis as “a wise woman in her town” (Borghouts 1982, 26, note 123), perhaps indicating that each community would have had a wise woman, and

¹¹⁵ See Toivari-Viitala (2001, 228, note 11) for a list of examples of texts referencing going to the wise woman.

within the context of O. DEM 1690, an individual could seek the services of a wise woman outside of their community. The more consistent use of the definite article, *ḳ*, would then suggest that normally the workmen and their families would consult the local wise woman associated with the Deir el-Medina community, indicating that even if she lived outside of the town, she was still in some capacity associated with it.

The textual records of the *swnw* and the *hrp-srk.t* were dominated by administrative texts. Yet, all of the texts mentioning the wise woman are personal letters, which suggests that her connection with medicine was informal.

Simultaneously, the fact that one of these letters was written by *Ḳn-ḥr-ḥpš=f*, who had access to his own repertoire of medical texts as discussed in the previous chapter, demonstrates that her unique knowledge was significant enough to be sought by even the most knowledgeable members of the community.

These three roles, taken together, show how texts on medical treatments at Deir el-Medina (chapter three) were reflective of the medical professionals at the site, and in turn, suggest that the kinds of medical professionals available at the site may have been specialized to the medical problems most prevalent in a community. The *swnw*, present throughout the occupation of the village at Deir el-Medina, would have been a member of the workforce, paid through regular, supplementary rations, who was able to take time off to examine, diagnose, and treat sick members of the community. He would have specialized in remedies prepared as reactive medicine to pre-existing illnesses, such as the remedies outlined in P. Chester Beatty on internal diseases. The *hrp-Srk.t*, on the other hand, was likely paid supplementary rations on an ad-hoc basis to act as a divine intermediary and prepare amuletic texts and recitations to treat scorpion stings and snake bites, an issue that would have been prevalent at the site

(see section 5.8 for further discussion). Finally, the *rh.t* would have been consulted for diagnosing problems related to spirits of the dead and manifestations of the gods. Though she was probably not supported by the state, the *rh.t* was a necessary part of health care at Deir el-Medina when illnesses were perceived as originating from divine forces.

4.5 CONSPICUOUSLY ABSENT MEDICAL PROFESSIONALS

If the *swnw*, *hrp-Srk.t*, and *rh.t* were necessary medical practitioners for health care at Deir el-Medina, then what about those medical professionals not documented at the site? Several medical practitioners mentioned in the medical texts appear to be wholly absent from Deir el-Medina. Neither the *s3w* nor the *w^cb* priests of Sekhmet are mentioned in any letters to or from the village in the Leiden database.

The term *s3w* derives from the noun for both protection and amulet, and refers to those who produced amulets for protection. The presence of such protective amulets at Deir el-Medina indicate that these services were being rendered. The *s3w* would have acted as a divine intermediary, and likely would have been sought for preventative medicine. The role of the *s3w* thus parallels the role of the *hrp-Srk.t* in intervening with the divine prior to illness, and may have in fact been subsumed by the *hrp-Srk.t* at Deir el-Medina, especially as the latter would have been able to specialize in amulets protecting against bites and stings, a dominant concern at Deir el-Medina.

The *w^cb* priests of Sekhmet are also mentioned in the medical papyri with duties specifically associated with maintaining hygiene through ritual washing (Engelmann and Hallof 1996). Since their medical role was specifically based on purifying through washing in the temple, they could only perform these duties in temple complexes.

Consequently, their services could have been sought out by the people of Deir el-Medina, but they would not have likely been part of the community. *Wꜥb* priests of Sekhmet were clearly present in Thebes (e.g., *Jmn-wꜥḥ-sw*, TT 111, whose tomb dates to Ramesses II), and thus it is possible that the villagers accessed these individuals as part of their interaction with the broader Theban community.

Finally, it should be noted that in Egypt in general, we do not see textual references to individuals who specialized in assistance during childbirth, even though we have medical papyri which directly address gynecological issues (e.g., the Kahun Papyrus). These texts offer treatments to determine pregnancy, lactation, and childbirth (Feucht 1995, 97-103), but no specific mention of a “midwife.” Most research supplements this relative lack of information on childbirth with evidence in the Westcar papyrus (e.g., Chamberlain 2004), a text which references divine births and may not even be applicable to daily life. The very moment of birth, even, is rarely mentioned at Deir el-Medina, sometimes evidenced as valid absences when a workman’s wife is in labor (Toivari-Viitala 2001, 172-173). P. Leiden I 348 includes medical texts on child birth, showing a link between childbirth and the broader medical profession, suggesting that a *swnw* could offer care in case of complications. In addition, Janssen has identified three amulets for birth that were purchased at Deir el-Medina, also suggesting that childbirth would have been within the purview of responsibilities for a *sꜥw* or perhaps the *hrp-Srk.t* (Janssen 1975, 310-311). These amulets may have also supplemented fertility figures used to ensure pregnancy (Pinch 1983). The title “wet nurse” is both known in Egypt in general and present at Deir el-Medina, and possibly this woman would have had additional responsibilities associated with pregnancy and child birth.

4.6 ACCESS TO STATE MEDICAL CARE AND MEDICAL INGREDIENTS

While it is apparent that the state provided a wage and time off for a *swnw* and *hrp-Srk.t*, it still remains unclear who would have been able to use the services of these two individuals and whether additional support could be provided for non-working members of the community, specifically, the wives, elderly parents, and children of the workmen. Moreover, what additional provisions were made available by the state when members of the community were ill? The text indicates that members of the community had access to these medical professionals and to supplementary medical ingredients. This includes both the workmen and their wives.

Two texts suggest that wives of the workmen would have had access to the health care resources of the community and services of the physician. O. BM 5634 specifically allows for absences for *P3-hrj-pd.t* to prepare medicine for the scribe's wife. Thus, the scribe's wife not only had access to care from the physician, but could also receive medical remedies and treatments (*phr.t*).

O. Wente also offers insight into who was able to access services of the community for caretaking (Wente 1990, 143):

To the police captain Montumose:
What's the point of my sending that hin-measure of oil to the marketplace? Search for a goat for my wife who is ill and take possession of it. I'm not aware that I have been removed from the necropolis community!

Wente's interpretation of the final line of this text is a tentative reconstruction,¹¹⁶ but if correct, suggests that as a member of the necropolis community (*p3 hr*), the workman

¹¹⁶ The final line reads: *bw rh=j r-dd jt3 tw p3 hr*. Wente suggests the following alterations to make sense of the text: *bw rh-j r-dd jt3.tw=<j> <m> p3 hr* I did not know that I was removed from the necropolis' (Wente 1996).

was able to use the policeman to help procure this goat for his wife. Additionally, the workman is offering payment from his own wages for the goat. This is the only instance in any of the texts from Deir el-Medina where an individual specifically asks for a goat when someone is sick.¹¹⁷ Perhaps the use of private wages is explained by the unusual nature of the request.

In the ration texts, we see that the state could also distribute ingredients common in basic medical treatments to the workforce. O. Gardiner 246 begins: *rnp.t-zp 2 3bd 4 3ht sw 15 pš n3 phr.t n t3 jz.t m hrw pn* “Regnal year 2, month 4 of Akhet, day 15: portion of medicine for the crew on this day.”¹¹⁸ The text then lists specific workmen and their provisions (Table 4.4).¹¹⁹

Table 4.4 Distribution of medical ingredients to members of the workforce

<i>O. Gardiner 246</i>					
Workman	Incense	<i>sft-oil</i>	<i>hh-oil</i>	Honey	Fat
<i>wsht-nmtt</i> (right)	X		X		
<i>bw-kn.t=f</i>	X		X		
<i>jmn-nht</i> son of <i>k3s3</i>		X			
<i>mntw-p3-h^cpj</i>		X			
<i>hrj-šrj</i>				X	X
<i>nb-nfr</i>				X*	X**
* It was given in place of fat					
** It was given in place of grease, to satisfy the entire workforce [...]					
Note: Grease was also distributed, but the text is broken and so excluded.					

The fact that *Wsht-nmtt* is listed as “right” and the distribution of each ingredient was to two workmen suggests that these medical ingredients were being

¹¹⁷ Wente has even speculated that this is for sacrifice as an act of personal piety, even though in other texts goat sacrifice is seen as taboo. This speculation is impossible to prove, and it is equally likely that the goat was necessary for meat or other unknown purposes.

¹¹⁸ The transliteration and translation of this text is based on its transcription in a scan of Černý Notebook 31.46 provided by the Griffith Institute of Oxford University.

¹¹⁹ These translations are based on those provided in German by Helck. Unfortunately, as there is no published transliteration of this text, the original Egyptian terms are inaccessible.

distributed to each side of the gang. This is further corroborated by the statement that *Nb-nfr* received grease in place of fat to satisfy¹²⁰ the entire workforce.

One would expect that the members of the gang receiving medical provisions would be the foremen or scribes, as their level of literacy would have given them the most access to medical texts. Alternatively, of course, one would expect to see the doctors listed, such as *P3y-ʿn* who was a doctor in Deir el-Medina during the reign of Ramesses IV.¹²¹ None of the individuals mentioned in this text, however, had titles associated with either medicine or leadership in the workforce (according to Davies 1999).¹²²

I argue instead that the provisioning of these particular medical ingredients to workmen was part of a system of care that could have been performed without the need of a professional physician. The medical provisions in O. Gardiner 246 are similar to those mentioned in many of the traumatic cases in P. Edwin Smith, and thus did not require divine intervention. Consequently, it is possible that fellow workmen could offer some level of medical care for illnesses thought to come from a non-divine origin, or illnesses that required basic medical knowledge for the use of honey, oil, and fat, rather than the more specific ingredients found in longer medical texts.

These texts indicate that the state used its resources to provide tools for improved health care in the workforce. Medical rations and paid medical professional care all served to protect workmen and their immediate family members from sickness. These both allowed the members of the community to receive diagnoses and

¹²⁰ Helck uses the verb *erfüllen*, though this may be based on the generic Egyptian verb *jrj* which has a multitude of meanings. Regardless, the reference to the broader workforce suggests that this was not for private use.

¹²¹ Mentioned in O. DeM 617, dated by Kitchen broadly to Ramesses IV.

¹²² Based on Helck's date for the text of year 2 of Ramesses IV. *Hrj-šrj*, referenced in Davies as Harshire (i), was a draftsman at this time and had not yet been promoted to scribe.

treatment for illness. The next component of their recovery is aftercare. Through allotted time off from work, the state allowed workmen to take care of each other and family members in order to improve overall health in the village.

4.7 CARETAKING AND NEGLIGENCE

Malnutrition and negligence will invariably negatively impact health; consequently, a strong network of providers for both personal care and nourishment will likely result in better overall health status. The following texts illustrate this network by identifying who were the caretakers at Deir el-Medina, what resources were available to take care of others, and how state support and social pressures integrated to guarantee members of the community had a strong social care network.

4.7.1 Terms for Taking Care of Others

There are two terms commonly used to refer to taking care of others at Deir el-Medina. The first is the idiomatic expression $jr=k hr=k n NN$, “You shall pay attention to N,” which uses hr (𓂏) as a literal representation of the gaze and thus attention of a person. While the phrase primarily uses people as the direct object (e.g., $jr=k hr=k n \text{𓂏}ddjw \text{𓂏}srjw$ “pay attention to the children”), it can also refer to animals (LRL 9), orders (LRL 5), or general actions (P. BM EA 10185, 3.6). For the purposes of this discussion, the phrase will only be considered when it is clearly meant to offer attention as a means for care, for example, in texts asking to pay attention to a sick relative.

The second term used at Deir el-Medina to refer to take care of others is nwj . This term seems to carry with it two separate connotations in the New Kingdom. First, it was used in contexts where an individual is taking care of possessions on behalf of another person (e.g., Stele of Horemchauf; pBM 10509, 3.14; New York MMA 35.7.55).

Second, it could alternatively be used when supplying provisions for someone (e.g., the stele of Seti I for Ramses I in his mortuary temple at Abydos). Both of these uses are attested at Deir el-Medina, with the use of the term to refer to taking care of property in the case of the death of Hormose and the need to supply provisions in O. Prague 1826.

4.7.2 Who were the Caretakers?

The majority of texts involving caretaking and provisioning—or a noticeable lack thereof—occur between family members. Table 4.5 and Figure 4.1 show all of the possible relationships for caretaking based on those texts which specify the relationship of the two individuals. In the vast majority of cases, textual evidence demonstrates that when care was provided, it was also expected in return. The only relationships that do not show this kind of reciprocation are when care is given from a mother to son or from a daughter to father. This lack is hard to explain, and may be a consequence of the limited size of the corpus. Regardless, the presence of multiple texts showing care between women and men show this was not limited based on gender. Additionally, all of these examples occur between nuclear family members that are one to two generations apart (i.e., between siblings or children with parents). Even within working relationships, text document that both workmen and their superiors had equal responsibility to take care of each other.

Several of these texts are absence from work texts (i.e., O. BM 5634, O. Cairo 25517, O. Cairo 25783-4, O. Gardiner 167, O. MMA 14.6.217, and O. Turin N 57388). In these cases, workmen were specifically allowed to be absent in order to provide care for sick relatives and bring provisions. Among these, multiple texts allow fathers to

take time off because their daughters were menstruating (*hsmn*¹²³). I suggest that these absences were actually related to provisioning these women, as there are other ostraca from Deir el-Medina that mention the delivery of such provisions to “the place of women” (e.g., O. OIM 19208).¹²⁴

Table 4.5 Caretaking Relationships at Deir el-Medina

Text	Provider	Receiver
LRL 8/P. Geneva D 407	Brother	Sister
LRL 9	Superior	Workman
O. Berlin P 11247	Son	Father
O. BM 5634	Son	Mother
O. BM 5634	Father	Daughter
O. BM 5634	Husband	Wife
O. Cairo 25517	Husband	Wife
O. Cairo 25521	Father	Son
O. Cairo 25783-4	Workman	Superior
O. Cairo CG 25725	Father	Daughter
O. DEM 560	Sister	Brother
O. DEM 560	Brother	Brother
O. Gardiner 167	Father	Daughter
O. Gardiner AG 32	Father	Son
O. MMA 14.6.217	Father	Daughter
O. Petrie 18	Wife	Husband
O. Prague 1826	Sister	Sister
O. Prague 1826	Mother	Daughter
O. Prague 1826	Brother	Sister
O. Turin N 57388	Father	Daughter
O. UC 39619	Wife	Husband
O. Wente	Husband	Wife
P. Ashmolean 1945.97	Daughter	Mother
P. Ashmolean 1945.97	Son	Mother

¹²³ While Janssen (1980, 141) questions whether *hsmn* can refer to menstruation, Frandsen (2007) and Wilfong (1999) demonstrate that this the most probable meaning for the term.

¹²⁴ For more explanation of the “place of women” and the term *hsmn*, used for menstruation, see Wilfong (1999).

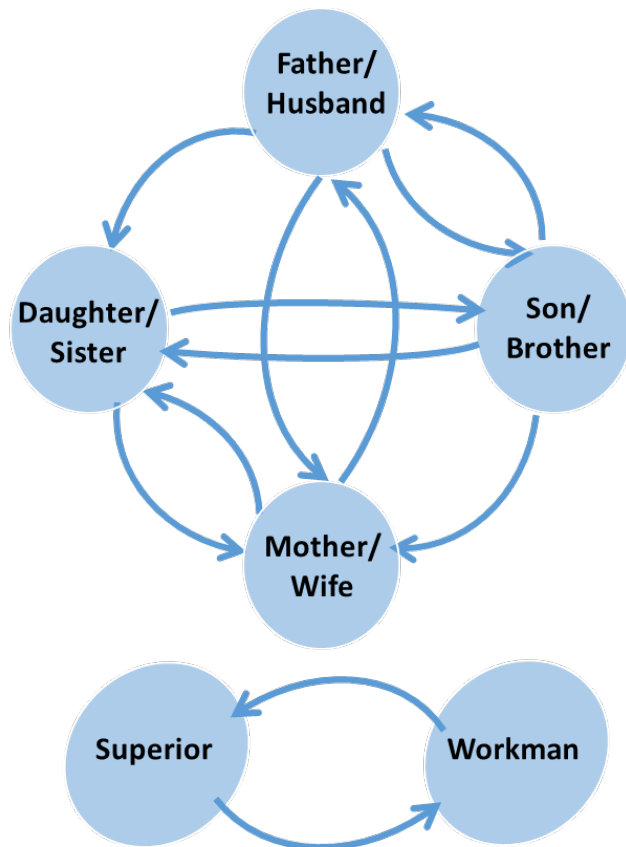


Figure 4.1 Map of caretaking relationships at Deir el-Medina

4.7.3 Expectations for Provisions and Care at Deir el-Medina

Texts relating to personal care demonstrate that there was social pressure to provide care for family members. The following text, O. Prague 1826, shows how a woman's husband berates her into asking for help with provisions from her family members:

Transliteration:

1. *dd n t3-hntj-špst n st*
2. *jyt m ᵑnh wd3 snb hnᵑ-dd r-ntt jw=j rdj jn.tw n=t n3 jt mtw=t djt šhmw.tw=w*
3. *n=j mtw=t djt bdt hr=sn mtw=t jr=w n=j m ᵑkw*
4. *p3-wn.t=j hr twtw hnᵑ mry-mᵑ3t [hmᵑ].tw r-bnr*
5. *hf mjn3 jw=f hr tw m-djt t3y=j mwt hr nd hrt n [jt n]*
6. *t hr bw jrt t3y=j mwt jrt =t nkt hf n=j hr dd hr*
7. *wnw m-dj=(t?) snw hr bw jr w nwj r=j hf=f hr nrh*
8. *m-dj=j m-mnt hr ptrj p3y jr=t r=j m-š3ᵑ*

9. ndr ḥms dj Jw rmt nb ḥr ḥ ḥnkt
10. rmw m-mnt n3y=sn rmt

Translation:

1. Said by tA-Xntj-Spst to (her) sister
2. Jjt in life, prosperity and health! And saying regarding the matter: I will cause that one bring to you the barley and you will cause one to grind them
3. for me and you will add emmer to them and you will make them for me as provisions
4. because I am quarrelling with Mery-Maat. “I will throw (you) out”¹²⁵
5. so he says when he quarrels with my mother (for) asking the amount of barley for
6. bread. “Now, your mother does not do things for you” he says to me, saying “Even though
7. you have siblings, they do not take care of you,” so he says, yelling
8. at me daily. “Now look, this is what you have done to me ever since (I) resided here while everyone is bringing beer
9. and fish daily (to) their people.”

This text suggests that immediate family members were expected to support each other through providing both the food and labor required to process ingredients. The husband’s frustration with his wife demonstrates his expectation that she provision him from the extra fish and beer of her siblings, as this was common practice.

Consequently, the strength of one’s caretaking was directly related to the provisioning of family members and the amount of care actually provided by these family members.

Similarly, in some cases one’s family members were also needed to provide medical ingredients. For example, in O. Berlin 11247 (Deir el-Medine Online 2009), a man asks for eye treatment from his son:

Transliteration

Verso

1. dd.t.n sš-qd P3j n s3=f P3-Rc-[ḥtp]
2. m jrj ḥ3c ḥ3=k r=j nn tw=j m-šs m jrj g[rḥ(?)][...]
3. m rmj.t n=j p3-wn tw=j m p3 [...]
4. nb=j Jmn ḥ3=f r=j

¹²⁵ Lesko contextualizes the phrase “to throw out” at Deir el-Medina to mean “to divorce” (Lesko and Lesko 1982, vol. II, 159).

RECTO

1. *jnj.tw=k(?) n=j m nkt bj.t n jr.tj=j m-mjt.t stj*
2. *jw=f m sht w3d*
3. *msdm.t m3^c.t*
4. *[...] sp 2 sp 2 tw n=k(?) sp 2 sp 2*
5. *js-bn jnk p3j=k jt*
6. *hr tw=j gbj*
7. *tw=j hr wh3 jr.tj=j nn sw*

Translation

Verso

1. That which the draftsman Pay said to his son Pa-ra-hotep
2. Do not turn your back on me, I am not well.
3. Do not stop weeping for me because I am in [darkness?]
4. My lord Amun has turned his back against me.

Recto

1. You shall bring for me some honey for my eyes and likewise ochre
2. Which is freshly molded.
3. And real black eye paint
4. [...]! And [...]!
5. Am I not your father?
6. I am damaged
7. And searching for my sight, but it is gone.

While the draftsman feels abandoned by Amun in his appeals to have his vision restored, he still believes that his son can acquire the necessary medical ingredients to assist him. By stating “Am I not your father,” the workman appeals to his son’s duty to provide him with care.

While these cases show us that provisions may have been expected from family, they were not necessarily offered freely. In O. Cairo 25725, *Kn-hr-hpš=f* accuses his own daughter for keeping his shirt which he gave to her when she was ill (recto 1-4):

Transliteration:

1. *r n kn-hr-hpš=f n t3 knbt ir jnk di w^c n*
2. *d3jw n t3y=j šrj jw st g3b.tj¹²⁶ hr jr st hr snb*

¹²⁶ Stative form of *gbj*, “to be weak; to be deficient” (TLA lemma 166950; Wb 5, 161.8-162.5).

3. *jw=j hr h3b n st hr {dd} jmm=fjw st hr tm dj.tw=fjw st hr jn n=j w^c ms*
4. *hr dbjt jw=j hr dit b3kw=fjw=j hr sht=fjw=j hr djt=f n=s*

Translation:

1. Speech of *Kn-hr-hpš.f* to the council: Regarding me, I gave a
2. garment to my daughter while she was in a weak state. Now, when she was healthy,
3. I wrote to her, saying: “Return it!” Then, she did not give it back, though she did bring to me a
4. basket of *db.yt* plants: I caused it to be worked, I wove it, and I gave it to her!

The scribe *Kn-hr-hpš.f* is placing this fight before the *knb.t*, a legal court, and thus publically denouncing his daughter for not returning his garment. He goes on to specify the exact amount she owes him, and mentions multiple exchanges between the two of them before the text is broken. This exchange demonstrates that, at least in the mind of *Kn-hr-hpš.f*, it is appropriate to borrow clothing while sick, but these items are only loaned temporarily, even among immediate family members.

The above texts demonstrate specific expectations of care between family members. These dominate the texts relating to personal care at Deir el-Medina (see Table 4.5). So how were individuals looked after if they were without their family? One of the Late Ramesside Letters suggests that provisioning and caretaking may have been part of the professional responsibilities of superiors or overseers in such situations:

LRL 9=P. BM 10326, recto 10-12

Transliteration:

10. *hr.tw=j m-šs (zp 2) m-dj p3y=j hrj bw jr=f nn¹²⁷ n=j dj=f mntj¹²⁸*
11. *n=j w^c mdk.t rwd r^c 5 5 k n whm m-mnt w^cn w jw=f šzp*
12. *hnw n hnk^t m-mnt m p3y=f^ckw hr srwj=st p3 mr j.wnw jm=j*

¹²⁷ The verb *nnj* literally means to be weary or inert (WB 2, 275.208), with a focus on a lack of overall movement. In this context, it is written in the aorist (*bw jr=f sdm*) to connote the superior customarily attends to him, rather than being inactive (*nnj*).

¹²⁸ Wente (1967, 39, n. f) notes to see Gardiner (1941, n. 2) for an explanation of the translation “to be fixed” for *mn*.

Translation

10. Moreover, I am in a very good state with my superior. He is not idle towards me.
11. He caused one to fix for me a *mdk.t*-jar for five days, five of bread provisions daily, and one *nw* jar, while he receives
12. *hnw* of beer daily in his provisions (wages). And now it (the beer)¹²⁹ has removed the illness which was in me.

Dḥwtj-ms, who is in a near constant state of illness, indicates that his supervisor made sure that he was properly provisioned in order to become well, an especially generous act since it appears to have been at his supervisor's expense.

4.7.4 Taking Care of the Elderly

Some of the members of the community of Deir el-Medina lived to be octogenarians, and many individuals reached an age where they had adult children and grandchildren (Bierbrier 1975, 115–116; Davies 1999; McDowell 1998; Sweeney 2006). In these later decades, when it may have been impossible for men to continue to traverse the valley as workmen and women would have had a difficult time preparing beer and bread, what societal infrastructure was in place to ensure provisioning for the elderly?

Census data suggest that a mother of a workman could live in his household (Demarée and Valbelle 2011), and thus could potentially benefit from the provisions and care of her son's wife and children. Elderly elite men could also keep a salary without necessarily working by appointing their son to share the position. For example, *Jmn-nḥt* shared his position with his son, yet maintained the same salary after his son took on the office (McDowell 1998, 208). Both the father and son were given a wage, though the son likely took on many of the responsibilities formerly held

¹²⁹ As in college campuses today, this text demonstrates that at Deir el-Medina, beer was celebrated for its ameliorative affects.

by the father. Additionally, in some cases workmen would pay their father's stipends (*djw*¹³⁰) out of their own salaries. For example, *Wsh-t-nmtt* paid his father a monthly salary immediately after his father's name no longer appears in the ration texts, suggesting that this was meant to provision his father after retiring (McDowell 1998, 211). Women could also receive similar stipends (McDowell 1998, 213), though it is ambiguous whether these payments were made to divorced women who were no longer living with their former husbands, widows, or the elderly.

4.7.5 Negligence

Information written at Deir el-Medina was often recorded because someone was acting in opposition to the status quo, rather than in conjunction with it. Consequently, we have more texts that mention neglect than care.

Two wills demonstrate that when family members were negligent at Deir el-Medina, they could be publically shamed and fiscally punished. In the will of Naunakhte (*Njw-t-nht.j*), both Naunakhte's adult sons and adult daughters were expected to offer some form of care for their elderly mother. Yet, several children are cut out of the will for not taking care of Naunakhte in her old age (Černý 1945). The ones who do offer care are not only included, but even given specific valuables as a reward for their service. By publically calling out those members of the family who were negligent and by rewarding those who took care of her, Naunakhte uses her position to coerce her children into taking care of her.

¹³⁰ See discussion by Mandeville (2010, 14).

This strategy was not only used by Naunakhte. We also see the reattribution of possessions in O. UC 39619/O. Petrie 18, where *Jmn-p3-h3pj* removes his wife from his will after she neglected him:

Transliteration

Recto

1. [rnp.t-zp] 7 3bd 4 šmw sw11 hrw pn
2. [...] rmt̄ jz.t jmn-p3-h̄pj hn̄ n̄h-njw.t nt p3y [...]
3. [dd=f jr] jnk p3 mr jw n=j [...] jw=j hr dd n t̄y šnt [...]
4. [...] n 3ht jnk jw st šmt n=s r 3ht jw=j jrt 3bd? Jw=j hms=kwj jw=j
5. w̄c šsp sw p3 djw j.di n=j p3 pr-ʿ3 n̄h.wd3.snb jw=st jt3=f j.jr=s? [w̄hm j.r]
6. [...] jw'j hms'kwj bn st jnk bwpwy' [sw] jrt n=j nfr rmt̄-jz.t jmn-w̄c
7. [...] šrj [...] =f hr jrt n'j nfr jw'j g3b'kwj p3y'f šrj p3y [...]
8. [...] jr 3ht nb jnk hn̄ t3 st krs m-mjtt st nb n p3y'j
9. [...] mjtt [...] jnk jw=w n n̄h-mwt p3y=j [...]
10. [...] jry=f

Translation

Recto

1. Regnal year 7, month 4 of Shemu day 11. This day:
2. [An argument between] the workman *Jmn-p3-h̄pj* together with *n̄h-njw.t* of the [necropolis]
3. he said thus: "I was the one to which the sickness came. [...] I said to {my} wife [...]
4. [...] of provisions which are mine. She went for it to the field while I spent a month
5. sitting alone. She seized the *djw*-cloth. It was the pharaoh (LPH) who gave it to me! And she took it!
6. I was sitting (there) without that which is mine. She was not good to me, the workman *Jmn-w̄c*¹³¹
7. [...] younger [...] was good to me while I was weak. His son, [...]
8. [...] as for the all of the things which are mine together with the place of burial, likewise all places of my
9. [...] they are for *N̄hm-mwt*, my [...]

¹³¹ The workman *Jmn-w̄c*, who offers care instead, has been identified as *Jmn-p3-h̄pj*'s son, but from this text alone in which he is only labelled as a workman (Davies 1999, 172). Consequently, the relationship between these two men remains unclear.

Whereas in the case of Naunakhte, punishment was after long-term negligence, this will shows that *Jmn-p3-h3pj* punished his wife for neglecting him after one specific incident.

4.7.6 The Death of *Hr-ms*

The most extreme case to be made for negligence as both directly affecting health and social relationships is the death of *Hr-ms*. Very few deaths are clearly recorded at Deir el-Medina, so the series of texts relating to the death of *Hr-ms* offer a promising glimpse into the health care and treatment of this individual. Three texts directly discuss the health and death of *Hr-ms*: O. Gardiner 67, O. DEM 126, and O. BM 5634.

In O. Gardiner 67, *Hr-ms* writes a complaint to *Pn-nbw*. He states that while he was working in the granary of the temple of *Maat*, he became bedridden, *sdr=k(wj)*¹³² (recto 1-3). He goes on to explain that a member of the necropolis (*R^c-j-3*), who was also a follower of the court, confiscated some of his things (recto 3-6). He essentially writes to *Pn-nbw* in order to be taken care of while sick, where care specifically means looking after his (*Hr-ms*) possessions. While the relationship between *Hr-ms* and *Pn-nbw* is never clearly stated, Davies suggest that *Hr-ms* was either the father or grandfather of *Pn-nbw*. This text further establishes a period where *Hr-ms* was bedridden, though as the verso of this text dates to year 31 of Ramesses II, it is possible that this period of illness significantly predates our other texts.

¹³² The verb *sdr* (TLA lemma 150740; Wb 4, 390.9-392.6) means literally to lie down or to sleep. In this case, it is written in the stative, connoting the individual is bedridden.

In O. DEM 126, we learn that *Hr-ms* has died. This likely occurred in year 40 of Ramesses II as in O. BM 5634, *Jmn-m-wj3* takes a day off on 1 *prt* 15 to embalm *Hr-ms*. There is little information to explain why *Jmn-m-wj3* was part of the embalming process in this instance and even including burial wrapping as a reason for absence is relatively uncommon. Based on Davies, there is no direct familial relationship between the two. The fact that he was chosen rather than *Pn-nbw*, *Jmn-m-wj3*'s own son or grandson who was explicitly not absent, could be interpreted to mean that *Pn-nbw* was socially excluded from this rite, which explains why it was written as an excuse for absence. This is difficult to prove, however, without further textual documentation of *Hr-ms*'s embalming.

In O. DEM 126, the scribe *Pj-3y* and the inhabitant of the necropolis, *M-^c-hwj*¹³³ write to *Nfr-htp*, the chief workman, and *Pn-nbw*:¹³⁴

Transliteration:

1. zš pj3y ms hr m-^c hwj n
2. 3 n jz.t nfr-htp rmt-jz.t pn-nbw m ^c.w.s
3. hn^c dd jh n3¹³⁵ ntj tw.tn hr ddw jr rmt nb ntj hr
4. mwt n3 wnw.tw=tn hr šm hr smtr hr=sn n3 hr.w
5. p3y=tn rmt p3y rmt mwt m pr n hr m hb jw=f hr
6. h3b n=j r-dd Hr-ms mwt¹³⁶ jw=j hr šm hn^c m^c- hwj
7. [...] hr ptrj jw=n hr nw=f jw=n hr djt jn.tw
8. [...] r-dd nw=k sw m nw nfr tw=n h^c
9. [...] djt k3 t3 mdt m dj n=tn hr jrt[...]
10. [...] ntj jw=tn r gm=f hr-s3 rn

¹³³ Davies suggests that *Pj-3y* and *M-^c-hwj* are brothers (Davies 1999, 8–9), explaining the co-authorship of this text, but this does not fully explain why it was necessary for *M-^c-hwj* to be added as an author.

¹³⁴ This translation is based on the transcription in KRI III (532), translation by Wente (1990, 143), and Green's translation, notes, and commentary (1976).

¹³⁵ The term *n3* (WB 1, 89.13) is used throughout these introductory phrases as a neutral interrogative particle.

¹³⁶ Here, *mwt* is in the stative implying the individual has already died. This is in opposition to the earlier first present construction in the same text, *hr mwt*, which implies an individual is in the process of dying.

11. [...] *gm r-dd hdbw=f*
12. [...] *mdwt jw bn* [...]
13. [...]

Translation:

1. The scribe *Pj3y* and the youth of the tomb *M^c-ḥwj* to
2. the chief workman *Nfr-ḥtp* and the workman *Pn-nbw*: Life, prosperity, and health!
3. Together with the following: What is it that you are saying? As for any man who
4. dies, did you go to inquire about them? Is your man an exception?
5. This man had died in the house of *Ḥr-m-hb* when
6. He (*Ḥr-m-hb*) sent for me saying “*Ḥr-ms* is dead” And I came together with *M^c-ḥwj*
7. to see. So we took care of him and we caused that one bring [him]
8. saying “may you care for him with good care” [...]
9. and we are elevating¹³⁷ the matter with you while making
10. [the inventory]¹³⁸ which you will find itemized.
11. [...] find saying, “He was killed...”
12. [...] matter not [...]
13. [...]

These opening lines read as an accusation. The authors imply that *Pn-nbw* and *Nfr-ḥtp* did not treat *Ḥr-ms* as was normal when someone has died. The authors then had to come in and take care of the body and will of *Ḥr-ms* through asking that someone take great care in moving the body and through carefully inventorying his possessions. They send *Pn-nbw* and *Nfr-ḥtp* the itemized inventory while chastising them for not taking care of *Ḥr-ms* in the first place. Unfortunately, the end of the text becomes fragmentary, and it is difficult to ascertain what happens next.

The final lines of the letter, which are incomplete, include the phrase *hdbw=f*, ‘he was killed.’ This enigmatic final line, given the context of *Ḥr-ms*’s death, may not literally refer to the murder of *Ḥr-ms*, but rather the negligence of *Pn-nbw* and *Nfr-ḥtp*

¹³⁷ Literally, “causing that the matter be high.”

¹³⁸ I have supplied inventory here as was done by Wente (1990, 143), as this term makes sense in the space provided and given its context.

in caring for *Hr-ms* before and after his death. In conjunction with O. Gardiner 67 and LRL 9, it is clear that *Pn-nbw*, as *Hr-ms* son or grandson, and *Nfr-htp*, as his supervisor, were expected to take care of him. Their neglect is thus a serious matter, evoking the idea of murder in the minds of *Pj3y* and *M^c-hwj*.

These documents demonstrate how communal response to neglect would have coerced family members into taking care of each other. In this case, the community actively reacted to *Pn-nbw* neglecting his father/grandfather, *Hr-ms*. *Pn-nbw* was reprimanded by community officials in writing and potentially excluded from burial rites, an act which would have forfeited his rights to inheritance (Janssen and Pestman 1968). The fact that *Hr-ms* was in the home of *Hr-m-hb*, who ultimately reported his death, shows that *Hr-m-hb* most likely took over the care of *Hr-ms*, reassigning it away from *Pn-nbw*. With this in writing, he further could have been the beneficiary of *Hr-ms*' will if we compare this situation to the will of *Jmn-p3-h3pj*, thus corroborating the possibility that *Pn-nbw* was excluded from inheritance. Therefore, these texts document how the community response actively punished *Pn-nbw* both fiscally and socially.

The death of *Hr-ms* and other cases of neglect show us that at Deir el-Medina, the community attempted to uphold its own social expectations for personal care from family members through legal and social coercion. There was a social expectation for immediate family members such as siblings and parents to provision and take care of their family members through processing and providing food, lending clothing, and nursing. The texts show attempts to guilt family members into care, but even in these cases, we see that one could be neglected by family and that such neglect may even

lead to premature death. In cases of neglect, a member of the community could use their legal will to shame a family member for neglect publically, legally, and fiscally. The expectation for reciprocation of care was further incentive in this informal system. These various mechanisms thus allowed the village to maintain a structure of informal personal care.

4.8 A HEALTH CARE NETWORK AT DEIR EL-MEDINA

	State supported	Privately arranged
Examination, Diagnosis and Prognosis	<ul style="list-style-type: none"> • <i>swnw</i> 	<ul style="list-style-type: none"> • <i>rh.t</i>
Treatment	<ul style="list-style-type: none"> • <i>swnw</i> • <i>hrp-Srk.t</i> 	<ul style="list-style-type: none"> • Family members with private medical texts
Aftercare	<ul style="list-style-type: none"> • <i>swnw</i> • Colleagues 	<ul style="list-style-type: none"> • Family members

Figure 4.2 The Health Care Network at Deir el-Medina

This chapter demonstrates the presence of an infrastructure for health care at Deir el-Medina that was balanced between professional services fiscally supported by the state and personal care maintained through social expectations within the village (Figure 4.2). This infrastructure would have looked different based on an individual's position, literacy, and familial support.

Highly literate members of the workforce and their families would have had the most options available to them for health care. They could use the *swnw* for examination and diagnosis, or seek counsel from the *rh.t* through private funds. They

could receive treatments and remedies from the *swnw* and *hrp-srk.t*, or get treatments from family members through the use of private medical texts. They could receive aftercare from their colleagues, sometimes even through requiring care from subordinates, and also receive care from family members who may have had higher rations and therefore more provisions.¹³⁹ Essentially, they had access to all of the private and public means of health care available at Deir el-Medina in every step of the medical process.

Regular members of the workforce, on the other hand, would have had limited access to these different modes of privately arranged care. They would have fewer rations to pay for outside diagnoses from the wise woman, limited access to private medical texts, and potentially less family support.

Health care in non-state supported communities outside of Deir el-Medina was likely even more restricted. While the villagers at Deir el-Medina would have had access to resources provided by the state such as the village *swnw* and *hrp-Srk.t*, outsiders may have had to pay for these services privately. They likely would not have had time off from work to take care of colleagues and family members.

Members of the workforce at Deir el-Medina also had time off from work to recover from illness, and this is of particular interest at Deir el-Medina owing to the numerous absence from work records recovered from the site. This chapter has already shown the various documented circumstances for absences related to

¹³⁹ Administrators of the gang not only had the ability to choose new appointees, but these positions could also be bought (McDowell 1999, 230). Thus, elite members of the community such as the scribes and foremen would not only have received higher rations, but could have ensured their families were also compensated as members of the workforce.

caretaking, but what can sick days also tell us about illness and health care at Deir el-Medina?

5 TEXTUAL EVIDENCE FOR ILLNESS AT DEIR EL-MEDINA

The previous two chapters have outlined perceptions of disease at Deir el-Medina as well as treatments. Very few of these texts, however, document the rates of illness at the site or the impact of illness on work on the royal tomb. Moreover, while it is clear that workmen were able to get time off from work to take care of others (chapter four), the previous two chapters do not address how sanctioned sick days contribute to overall health of the community.

In this chapter, I use a scalar approach to analyze absence from work records at Deir el-Medina during the 19th and 20th dynasties, focusing on understanding how the short-term illnesses present in these texts affected morbidity patterns at the site. At the broadest scale, I use the entire corpus of absence from work texts to demonstrate a seasonal distribution of absences which can be accounted for by the seasonality of infectious disease in Upper Egypt. To supplement this broader scale, I also evaluate what these texts can tell us about the kinds of illnesses and their duration at Deir el-Medina. I then offer a circumstantial case for the contagion of one infectious disease in O. BM 5634 by identifying its transmission through the sequential absences of different workmen in the entire gang. Finally, I evaluate the impact of one disease on one workman through a close reading of the absences of *Mr-Shm.t* in O. Cairo CG 25785. This text elucidates how expectations for a workman's productivity were likely harmful to his well-being. I then combine these three levels of analysis to explore the social and economic ramifications these diseases would have had on both individual workmen and workforce productivity at Deir el-Medina.

This research complements research in the previous chapters on health care at the site and supplements research in the following chapters on disease in the human

remains by providing evidence for short-term diseases, which leave no mark in the skeletal record and are otherwise poorly attested in personal letters and medical texts.

5.1 PREVIOUS RESEARCH ON THE ABSENCE FROM WORK TEXTS

This study uses 77 “absence from work” texts to assess patterns in health-related absences from work at Deir el-Medina. These texts consist of 2,043 total absences recorded over a 127-year period beginning in year 40 of Ramses II and ending in year 14 of Ramses IX. Table 5.1 shows a list of these texts and their dates.

The absence from work texts were amassed from the Deir el-Medina database at Leiden which currently includes 144 total absence texts. Half of these texts had to be excluded from this study because they discuss only the general absence or presence of the entire workforce (e.g., O. Cairo JE 50250); are too fragmentary (e.g., O. Cairo SR 12042); are too poorly recorded to provide a complete date, name, and reason for absence (e.g., O. Cairo CG 25527); or because they are currently inaccessible (e.g., O. IFAO 252 is unpublished).

Despite the wealth of absence texts, many of which were translated, dated, and outlined by Helck (2002), relatively few publications analyze the reasons for these absences. Several of the publications referencing these texts use them strictly for dating (e.g., Collier 2004; Gutgesell 1983; Gutgesell 2002) or genealogy (e.g., Davies 1999). Other publications use the absence texts as an example of bureaucratic practices, but offer little additional analysis of the ostraca’s contents (e.g., Ezzamel 2012). Several publications have referenced these texts to discuss women’s health (Wilfong 1999; Frandsen 2007; Toivari-Viitala 2001), though it should be noted that

absences related to women's health account for less than 1% of all absences from work at Deir el-Medina.¹⁴⁰

The only publications which have delved further into the implications of these absences are from Janssen. Janssen (1980) offers the earliest and most influential publication through specifically discussing O. BM 5634, an ostrakon dating to year 40 of Ramesses II, which is the largest and most complete of all of the Deir el-Medina absence from work texts. In this publication, Janssen cites the reasons given for absences from this text to evaluate the general reasons for absence from work at Deir el-Medina. Particularly pertinent to health care, Janssen points out that workmen were able to take time off to take care of their colleagues (1980, 137). Further, they were able to take time off to mourn and embalm family members (1980, 140). One of the most important observations Janssen makes on O. BM 5634 is the few days actually recorded in this ostrakon (1980, 134). Despite the fact that it represents a 280 day period, only 70 days appear to have been active working days. Later, Janssen (1997, 87-98) evaluated the general terminology used in these absence texts, extending his study beyond O. BM 5634 (discussed below).

Table 5.1 Absence texts from Deir el-Medina

Text	Dynasty	Ruler	Regnal Year
O. BM EA 05634	19	Ramesses II	40
O. BM EA 50729	20	Ramesses VI	1
O. BM EA 50730 + O. BM EA 50745	20	Ramesses VI	1
O. Cairo CG 25505	19	Amenmesse	3
O. Cairo CG 25506	19	Amenmesse	3
O. Cairo CG 25507	19	Siptah	2
O. Cairo CG 25508	19	Siptah	3
O. Cairo CG 25510	19	Seti II	2
O. Cairo CG 25511	19	Seti II	2
O. Cairo CG 25512	19	Seti II	6

¹⁴⁰ Several of these are discussed in chapter four.

Text	Dynasty	Ruler	Regnal Year
O. Cairo CG 25514	19	Amenmesse	2
O. Cairo CG 25516	19	Siptah	1
O. Cairo CG 25517	19	Siptah	1
O. Cairo CG 25518	19	Siptah	1
O. Cairo CG 25519	19	Siptah	1
O. Cairo CG 25520	19	Amenmesse	2
O. Cairo CG 25521	19	Siptah	1
O. Cairo CG 25522	19	Siptah	2
O. Cairo CG 25523	19	Siptah	2
O. Cairo CG 25524	19	Merneptah	Unknown
O. Cairo CG 25525	19	Siptah	1
O. Cairo CG 25532	20	Ramesses IV	Unknown
O. Cairo CG 25533	20	Ramesses IV	3
O. Cairo CG 25599	20	Ramesses IV	Unknown
O. Cairo CG 25648	20	Ramesses IX	10
O. Cairo CG 25779	19	Amenmesse	1
O. Cairo CG 25780	19	Amenmesse	3
O. Cairo CG 25782	19	Amenmesse	3
O. Cairo CG 25783	19	Amenmesse	3
O. Cairo CG 25784	19	Amenmesse	3
O. Cairo CG 25785	19	Amenmesse	3
O. Cairo CG 25786	19	Amenmesse	Unknown
O. Cairo CG 25787	19	Siptah	1
O. Cairo CG 25793	19	Siptah	Unknown
O. Cairo JE 72461	19	Siptah	6
O. Cairo JE 72469	19	Unknown	Unknown
O. DEM 00099	20	Ramesses III	7
O. DEM 00209	19	Amenmesse	2
O. DEM 00284	20	Ramesses III	29
O. DEM 00339	20	Ramesses III	22
O. DEM 00340	19	Unknown	4
O. DEM 00353	19	Amenmesse	3
O. DEM 00389	19	Amenmesse	2
O. DEM 00594	19	Merneptah	8
O. DEM 00617	20	Ramesses IV	Unknown
O. DEM 00899	19	Siptah	Unknown
O. Gardiner 0037	19	Siptah	4
O. Gardiner 0115	19	Ramesses III	9
O. Gardiner 0148	20	Ramesses IV	5
O. Gardiner 0167	19	Amenmesse	3

Text	Dynasty	Ruler	Regnal Year
O. Gardiner 0174	19	Amenmesse	3
O. Gardiner 0232	19	Amenmesse	3
O. Gardiner 0290	19	Amenmesse?	2
O. Gardiner 0291	19	Amenmesse	3
O. Gardiner AG 032	19	Siptah	3
O. IFAO 1105	19	Amenmesse	3
O. Louvre E 13160	20	Ramesses III	Unknown
O. Michaelides 071	19	Siptah	2
O. MMA 09.184.702	20	Ramesses IV	1
O. MMA 14.6.217	19	Seti II	1
O. Turin N. 57026	20	Ramesses III	23
O. Turin N. 57028	20	Ramesses III	24
O. Turin N. 57029	20	Ramesses III	24
O. Turin N. 57030	20	Ramesses III	24
O. Turin N. 57035	20	Ramesses III	11
O. Turin N. 57039	20	Ramesses III	24
O. Turin N. 57046	20	Ramesses III	24
O. Turin N. 57056	20	Ramesses III	24
O. Turin N. 57281	20	Unknown	Unknown
O. Turin N. 57283	20	Ramesses III	24
O. Turin N. 57388	19	Siptah	3
O. Turin N. 57432	20	Ramesses III	20
O. Varille 06	20	Ramesses III	24
O. Varille 26	19	Amenmesse	2
P. Berlin P 14448	19	Siptah	Unknown
P. Turin Cat. 1999 + P. Turin Cat. 2009 verso	20	Ramesses IX	14
P. Turin Cat. 2072	20	Ramesses IX	10

5.2 THE ANATOMY OF THE ABSENCE FROM WORK TEXTS

Four parts:

1. Date
2. "Absence"
3. Name
4. Reason

3bd 1 prt sw 27	ḥ ^c .n	rwj	mr
Month 1 of Peret, day 27	Stayed:	Rutj	ill



O. Gardiner 0037. Hieratic and hieroglyphic transcription from Gardiner-Černý 1957.


Figure 5.1 Anatomy of an absence from work text

Absence records can consist of four parts, as demonstrated in Figure 5.1. First, the civil date is recorded including the regnal year, season, month, and day number. In some cases, the date is then followed by the term ḥ^c.n. Janssen has suggested that the verb ḥ^c, ‘to stand,’¹⁴¹ was used in semantic opposition to jwj, ‘to come, to return’¹⁴² (Janssen 1997, 87-98). The latter indicates the movement of active workmen, while the former suggests their stasis. As reasons for absences in the texts are often only explained with the location of the workman (e.g., “in the village”), it is thus logical to assume that the term ḥ^c.n applies to workmen who remained elsewhere rather than

¹⁴¹ Wb 1, 218.3-219.20; TLA lemma 40110.

¹⁴² Wb 1, 44.1-45.6; TLA lemma 21930.

coming to work. The third component of an absence from work record is the workman's name. In cases where multiple workmen were absent on the same day and for the same reason, multiple names were listed together. Additionally, when more than one workman had the same name, they were delineated by their fathers (e.g., *K3s3* son of *Pn-ḥnk.t*). Fourth and finally, the reason for the absence was listed. In many cases, the reason given is abbreviated to one word. The most common of these is the term *wsf*, fully written as , but often reduced simply to . This term has been discussed more fully by Janssen (1980, 145; 1997, 93-95), where he connects the word etymologically to the phrase “to be slack, to neglect.”¹⁴³ In this context, some Egyptologists have taken the term to mean “idle,”¹⁴⁴ though Janssen convincingly argues that given the variety of reasons listed with *wsf*, we should instead think of the term as a day where the workman was simply not working in the Valley of the Kings (1997, 94).¹⁴⁵ Given the numerous entries with this term, it is distinctly possible that it is a generic reference to absence, regardless of reason. This is supported by several absence from work texts which exclusively use *wsf* as the reason for absence (e.g., O. Cairo CG 25520). This term could have been used when the scribe determined it was unnecessary to explain the absence or when the explanation would not fit in the space available.

The second most common term is *mr*, , “illness.”¹⁴⁶ This term could be used for any kind of health-related problem which inhibits a workman from going to work.

¹⁴³ Wb 1, 357.2-9; TLA lemma 49520.

¹⁴⁴ See, for example, translations of the *Ramesside Inscription* volumes (Kitchen 1993-2012).

¹⁴⁵ Janssen does not go so far as to suggest this is an approved day off, or a day allocated to a workman.

¹⁴⁶ Wb 2, 95.1-15; MedWb 376-378; TLA lemma 71790.

The illness of the workman is in some instances explained, though this is rare and inconsistent. For example, the author of O. Gardiner 37 indicates that *Hwj* son of *Hwj-nfr* and *Rwtj* suffer from injuries in the legs and *Nb-nfr* son of *Pn-nbw* is suffering in his ears, but simultaneously does not explain the illnesses of several other workmen.

Due to the tendency for scribes to write the generic *mr* when a workman was sick, these texts cannot be used effectively to discuss the full spectrum of kinds of illnesses at Deir el-Medina. One can, however, understand aspects of these illnesses through the consistent recording of dates and names which allows one to evaluate the duration, seasonality, and communicability of illnesses as recorded in the absence from work texts.

5.3 THE DISTRIBUTION OF TEXTS AND ABSENCE TYPES OVER TIME

The number of absence from work texts and the nature of their contents change dramatically over the 19th and 20th dynasties, with both fewer absence texts and less detailed documentation in the 20th dynasty (Toivari-Viitala 2006). The earliest absence from work text is O. BM 5634, which dates to year 40 of Ramesses II. It not only contains the most complete list of absences over the longest duration of time for any one text, but also shows significantly more variation in the reasons given for absence than other texts from Deir el-Medina. In contrast, the latest text in this corpus, P. Turin Cat. 1999 + P. Turin Cat. 2009 verso, from year 14 of Ramesses IX only lists in general how many men were sick vs. working, with no other explained absences.

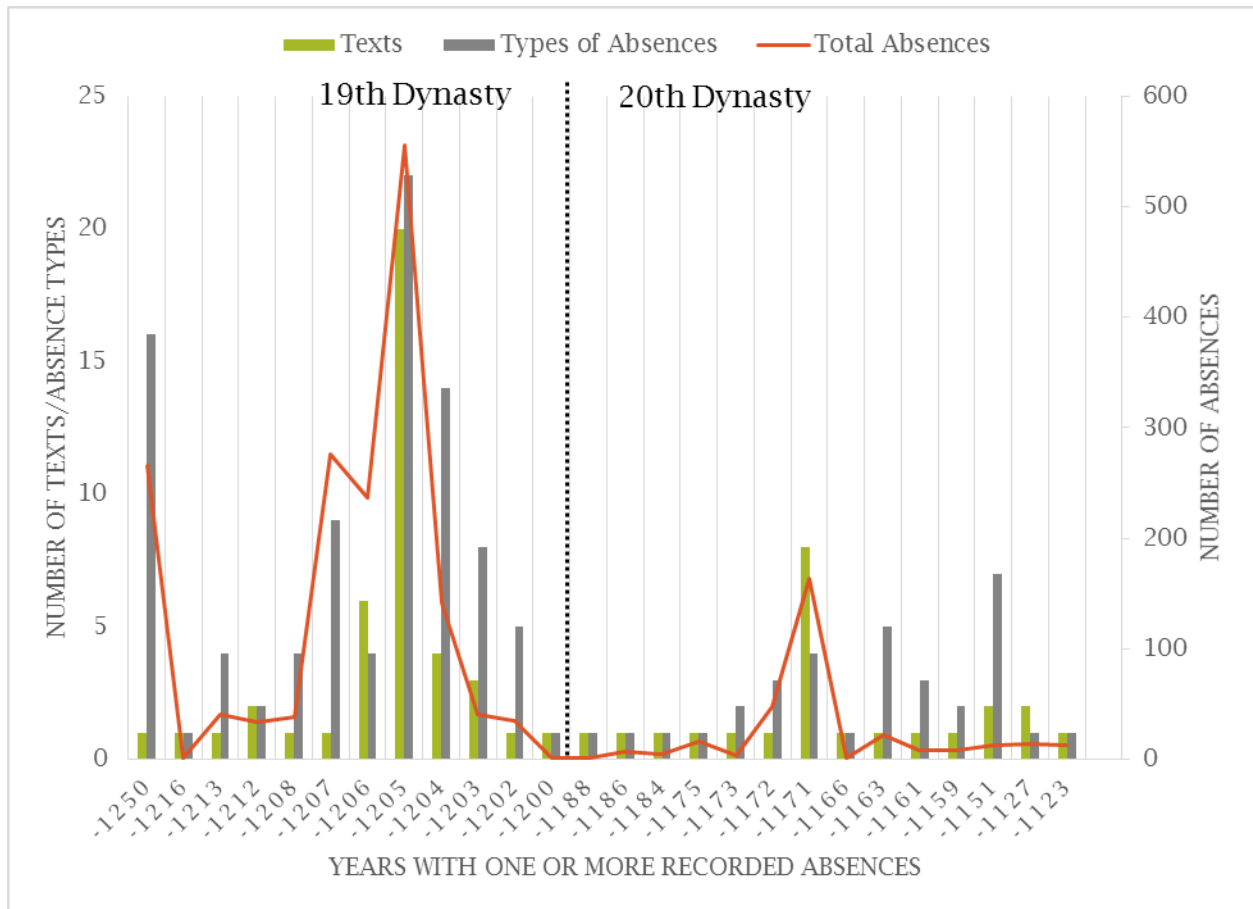


Figure 5.2 Distribution of absence from work texts

Figure 5.2 shows the total number of absences distributed over time as well as the types of absences for each year. The number and kinds of absences fluctuate greatly in the 19th dynasty, peaking in 1205 B.C.E.—at the very end of the 19th dynasty—with 22 different kinds of absences recorded and over 500 total absences. In the 19th dynasty, there was an average 128 absences per year;¹⁴⁷ by the 20th dynasty, the total number of absences in any given year drops to just 25. This reflects a broader shift in the administration of Deir el-Medina. While in the 19th dynasty, we find more administrative texts with more detail, by the 20th dynasty scribes only recorded the total number of workmen out on any given day. There is also much less variation in

¹⁴⁷ For years with one or more absence recorded.

the different types of absences recorded by the 20th dynasty, with only a handful of reasons in comparison to dozens mentioned in the 19th dynasty.

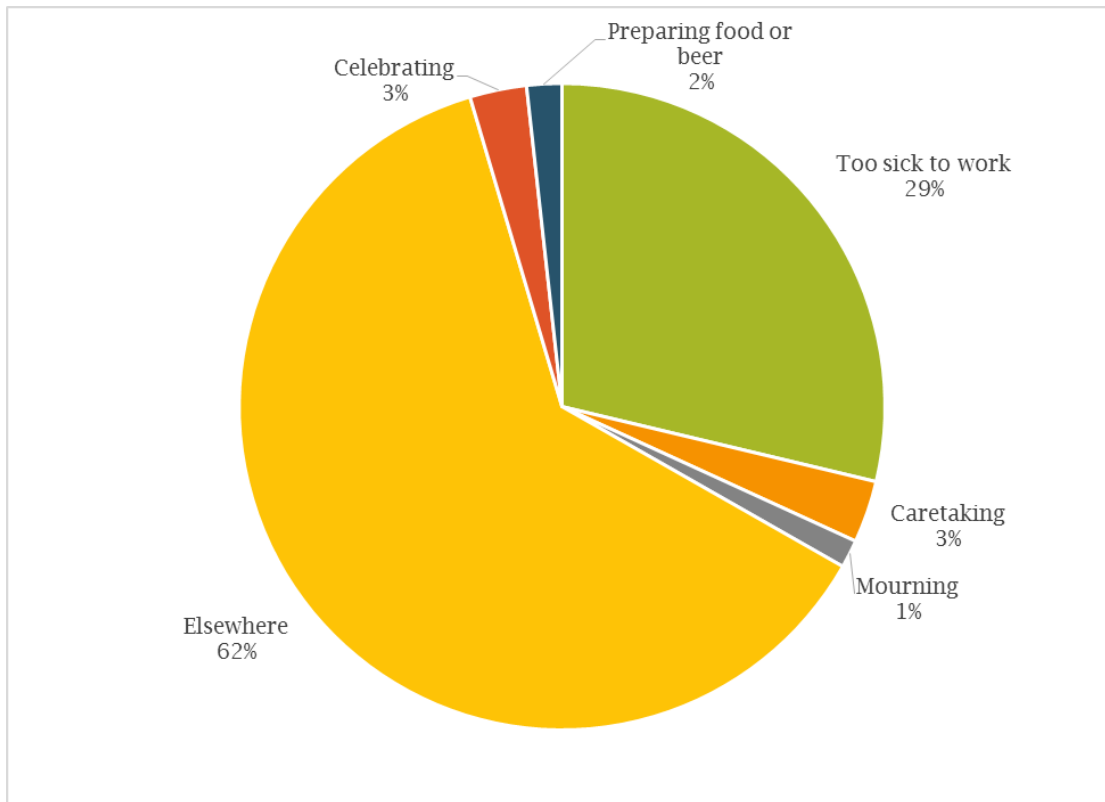


Figure 5.3 Distribution of reasons for absence from work

I have broken down the reasons for absences into the following categories: elsewhere (including *wsf*), too sick to work (including *mr*), celebrating, preparing food or beer, caretaking, or mourning.¹⁴⁸ The distributions of these (Figure 5.3) demonstrate that illness (*mr*) accounts for 29% of all absences. This value is likely an underestimate as well, as in some cases, the reason listed for a likely sick workman was the generic *wsf*; this term alone accounts for 40% of all absences from work. Additionally, some scribes recorded the location of the workman when he was sick, such as “in the village”

¹⁴⁸ For a full list of reasons for absence, see Helck (2002, 33).

which can be reconstructed in some cases (e.g., *Mr-Shm.t* as discussed below), but is otherwise ambiguous.

5.4 WHY RECORD ABSENCES FROM WORK?

The fact that workmen were able to be absent due to illness still begs the question: were they compensated for their sick time? The workforce at Deir el-Medina was compensated primarily with grain rations. These were, in theory, issued each month with varying amounts of rations due based on the status of the workman. The exact pay for workmen varied considerably over time, however, making it difficult to assess how pay would have equated economically to quality of life. Also, many absences from work were spent working elsewhere, such as on private tomb furniture or in other tomb valleys. These additional jobs would have offered a secondary income, as exhibited by texts showing economic transactions between the workmen and their patron (Cooney 2007).

The official term for wages paid by the Pharaoh to the workmen was *ḥtrj* (Janssen 1975, 457). The nature of these wages varied. While there appears to have been a consistent underlying use of grain for rations, additional daily life commodities such as fish, wood, and vegetables were also used (see for example O. DEM 206). The complexity of studying grain rations specifically is explained elsewhere (Mandeville 2010). Needless to say, the combination of a fractured archaeological record and inconsistent administrative practices at Deir el-Medina make it difficult to assess the actual rate of pay at Deir el-Medina. Based on his overview of ration texts, Černý suggests the standard distribution of grain rations for the workmen would have been as follows (1954):

- Foreman (*ʿ3 n jst*): 5 ½ *h3r*¹⁴⁹ emmer, 2 *h3r* barley
- Workman: 4 *h3r* emmer, 1 ½ *h3r* barley

While the inconsistency of the records shows that these values certainly fluctuated even within the same time period at Deir el-Medina, the relative values of the pay remain the same with the chief of the crew earning the most, followed by a slightly reduced salary for a standard workman.

In the majority of ration texts, position was the only means of pay discrepancy; workmen were generally not paid less based on their absences or productivity. Of texts that do have any differentiation in wage, the vast majority simply list subgroups of men (Mandeville 2010, 136-137). Dates are mentioned in less than half¹⁵⁰ and even fewer have names other than those of the scribe or foreman. Unfortunately, none have corresponding absence texts to verify whether any differences in pay could be accounted for from absences directly.

The very nature of these lists, however, suggests that absence was not a viable reason to receive different pay—the ubiquity of absences would preclude it.¹⁵¹ When subgroups of workmen are mentioned, there are often only one or two, rather than the many different subgroups one would expect based on absences. Moreover, several texts that mention the names of specific workmen still give them the same pay (e.g., O. Ashmolean 111; O. Cairo CG 25517). In some cases, the names of workmen along with smaller values were written because the rations were in arrears (see O. DEM 177 as described by Mandeville 2010: 62). Backpay or pay advances may explain why there

¹⁴⁹ A unit of measurement of approximately 77 liters. For further discussion, see Janssen (1975, 109-111).

¹⁵⁰ This is based on data in the Leiden database. The following are ration texts with dates and named workmen: O. Ashmolean 107; O. Ashmolean 111; O. Ashmolean 1139; O. Cairo CG 25517; O. DeM 188+373; O. DeM 374; O. DeM 377; O. DeM 381; O. DeM 611; O. DeM 698; O. DeM 846; O. DeM 10039; P. Turin 1960; P. Turin 2081.

¹⁵¹ This opinion has similarly been expressed by Janssen, (1997, 18).

were irregular amounts for some workmen in these texts and offers a more viable option than unpaid leave. Consequently, despite their absences due to illness or other reasons, workmen were likely paid the same amount in rations. This suggests that sick days were allotted in order to ensure the overall health of the workforce, but what does it indicate about the kinds of diseases present at Deir el-Medina or the administration's expectations for the severity of illness necessary to allow an absence?

5.5 THE SEASONALITY OF ABSENCE AT DEIR EL-MEDINA

In order to comprehend the impact of illness through the absence from work texts, I assess the distribution of absences using my entire corpus of 77 texts. As texts include day dates for illnesses, it is possible to trace the relative shift over time in the number of illnesses per day. One complicating factor, however, is the civil calendar in Egypt, which is based on a 365-day cycle. Every four years the cycle falls one day behind, resulting in a significant shift in the seasons over time. To adjust for this, Egyptologists have used dates which associate known Egyptian civic dates with celestial phenomena and the Gregorian calendar.¹⁵² Hornung, Krauss and Warburton suggest converting dates using the Ptolemaic Royal Canon dates, which start with the first years of Era Nabonassar and correlate Royal Canon, year 1, Thoth 1 to February, 26 747 B.C.E. (2006, 49). Accordingly, Egyptian dates for this study were converted to the Gregorian calendar using this method. This shifts the Egyptian calendar date by the total number of leap year days between an Egyptian date and 747 B.C.E., thus accounting for the difference in leap days lost over time. I use the UCLA Encyclopedia

¹⁵² Since the year is actually closer to 365.2525 days long, the Julian calendar also includes a leap day every 400 years. This is not taken into consideration in the Gregorian system, which means that Gregorian and Julian dates will be off by 10 days every 4,000 years. Such differences are too minor for significant impact on a study on seasonality.

of Egyptology chronology to determine absolute years for reigns (Schneider 2010). Alternative chronologies could result in a difference of up to twenty years by the end of the twentieth dynasty, but even then, the difference in the day date would be five days, and consequently would not affect one's ability to interpret broader seasonal trends.

This conversion assumes that the Egyptians never adjusted for the gradual shift in their civil calendar; however, some scholars have argued that the Egyptian calendrical system did in fact account for the lost day by adding an intercalculated day or by shifting the entire calendar back after it had shifted too far over time (for an overview, see Depuydt 1995). Such arguments are quickly contradicted based on the lack of textual evidence and the corroboration of Sothic and lunar dates with calendrical dates in the Illahun archive (Hornung et al. 2006, 48). Furthermore, the attempt by Ptolemy III to introduce a leap day was a failure (Hornung et al. 2006, 48), implying that at least by the end of the Late Period, Egyptian calendars did not include a leap day and Egyptian scribes were loath to change them.

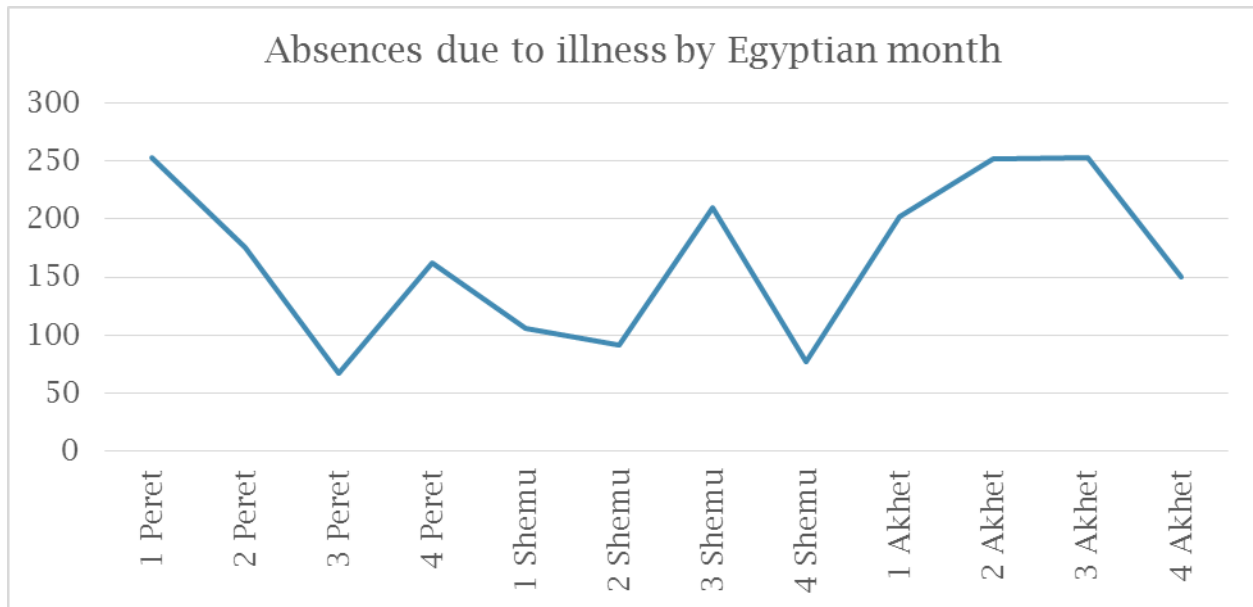


Figure 5.4 Absences due to illness by Egyptian month (raw data)

This is further corroborated by the absence from work records. The raw distribution of absences by Egyptian month (Figure 5.4), with no adjustment to the dates, is randomly dispersed over the course of the year. The erratic nature of these unadjusted dates suggests that either seasonality had no consistent influence over sickness, or, more likely, that the calendar did in fact lose a day every four years, skewing absence dates by as many as thirty-two days. In comparison, the calculated seasonal distribution of absences due to illness appears more regularly distributed over the seasons (Figure 5.5). This distribution shows a smoother curve, peaking in August with steadily decreasing sick days until the winter months of December and January.¹⁵³

¹⁵³ Though the month with the highest raw number of sick days is September, the smoothed data show a peak in August. Data was smoothed using three-month moving averages as used by Scheidel (2001).

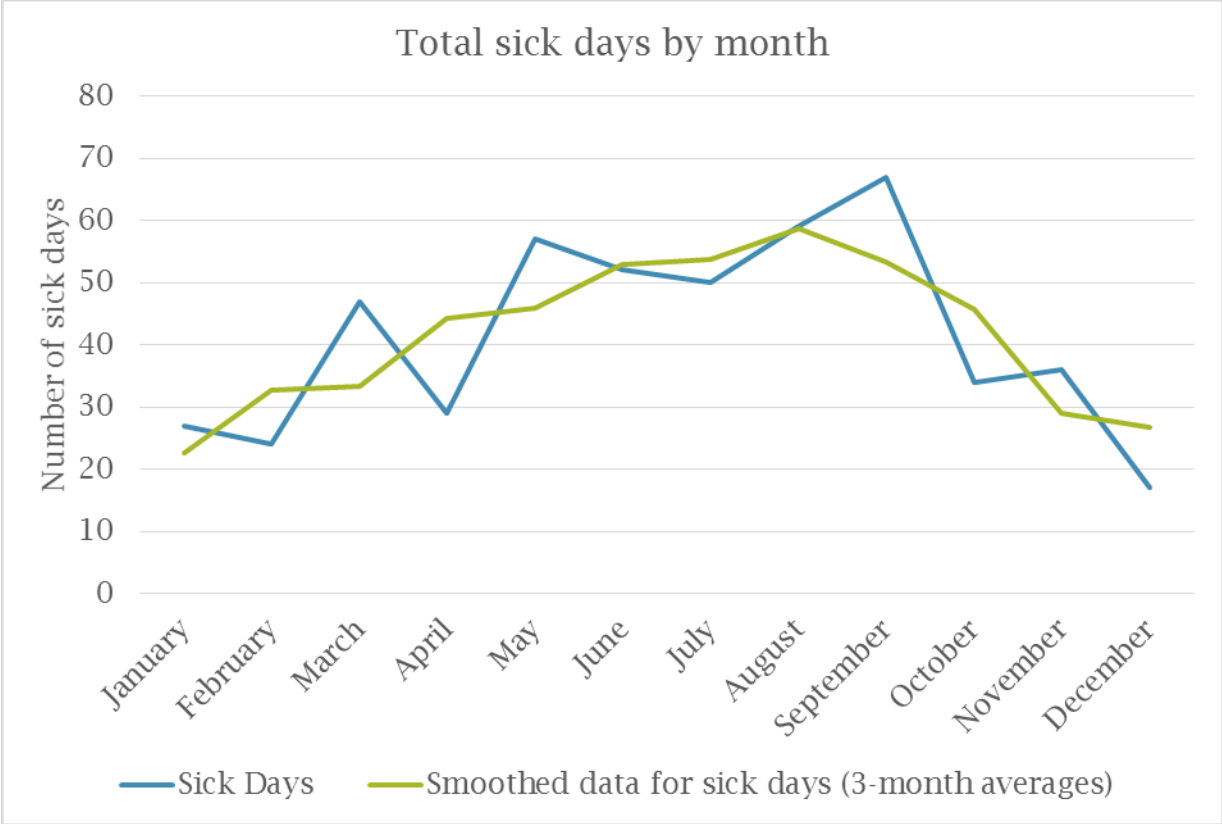


Figure 5.5 Absences due to illness by month (calculated)

This figure may be misleading, however, due to the total number of absences recorded per month. Significantly more absences were recorded in August through November than any other time of year, with noticeably fewer recorded absences in December and January. Since the total number of absences are highest in August and lowest in January, it is possible that the similar seasonal distribution of sick days is a greater reflection of the chance preservation of texts than actual trends in illness.

To account for this, I instead compared the ratio of sick days to total absences (Figure 5.6). This ratio shows a slightly different trend, moving the peak percentage of absences to April and the lowest percentage of absences to November. Based on these data, early spring had relatively more illness-related absences than both the hotter summer and colder winter months. Fall represents the lowest period of illness in the

year. This suggests that neither temperature nor the inundation, which occurs in late July, had the greatest influence over these trends in illness. It is also not feasible to blame the quantity of rations for this seasonal distribution since the harvest would have occurred in March after the flood waters had receded.

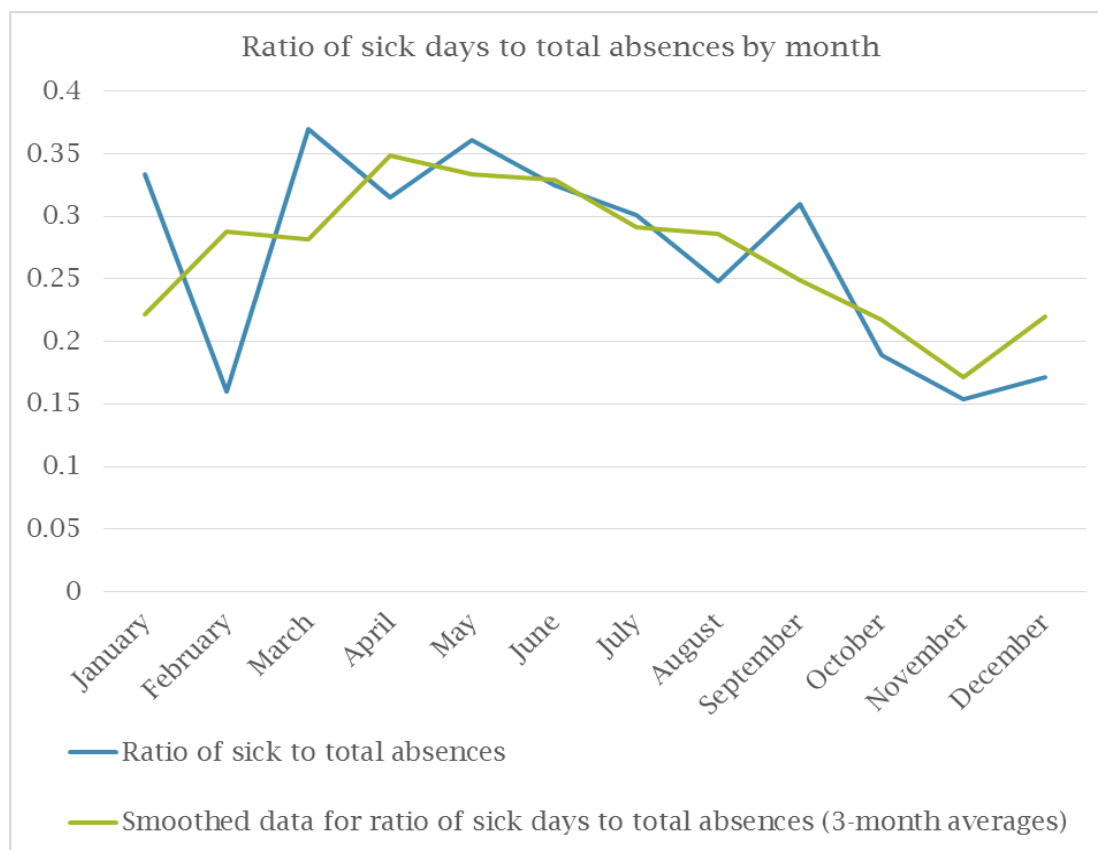


Figure 5.6 Ratio of sick days to total absences by month

Comparative data show similar trends in the seasonality of illness. Scheidel accounts for the seasonality of illness through documenting Roman mummy tags, Greek funerary inscriptions, and Coptic epitaphs from Egypt (2001).¹⁵⁴ He uses these data sets to ascertain when peaks in deaths occurred during the Roman period. Scheidel not only evaluates these diverse texts, but considers how they vary between

¹⁵⁴ Whereas the absence from work texts document morbidity, Scheidel's data document mortality. This study assumes that these two data sets are affected by the same underlying factors in the distributions of illnesses over the year.

Alexandria, the Fayum, and Upper Egypt. Mummy tags, Coptic inscriptions, and Greek inscriptions in Upper Egypt all demonstrate a peak in deaths by May, with a low in September (2001, 15). Though the timing of Scheidel's trend begins one month later and ends one month earlier than data from the absence from work texts, it shows the same development of increased illness in the spring and decreased illness in the fall.

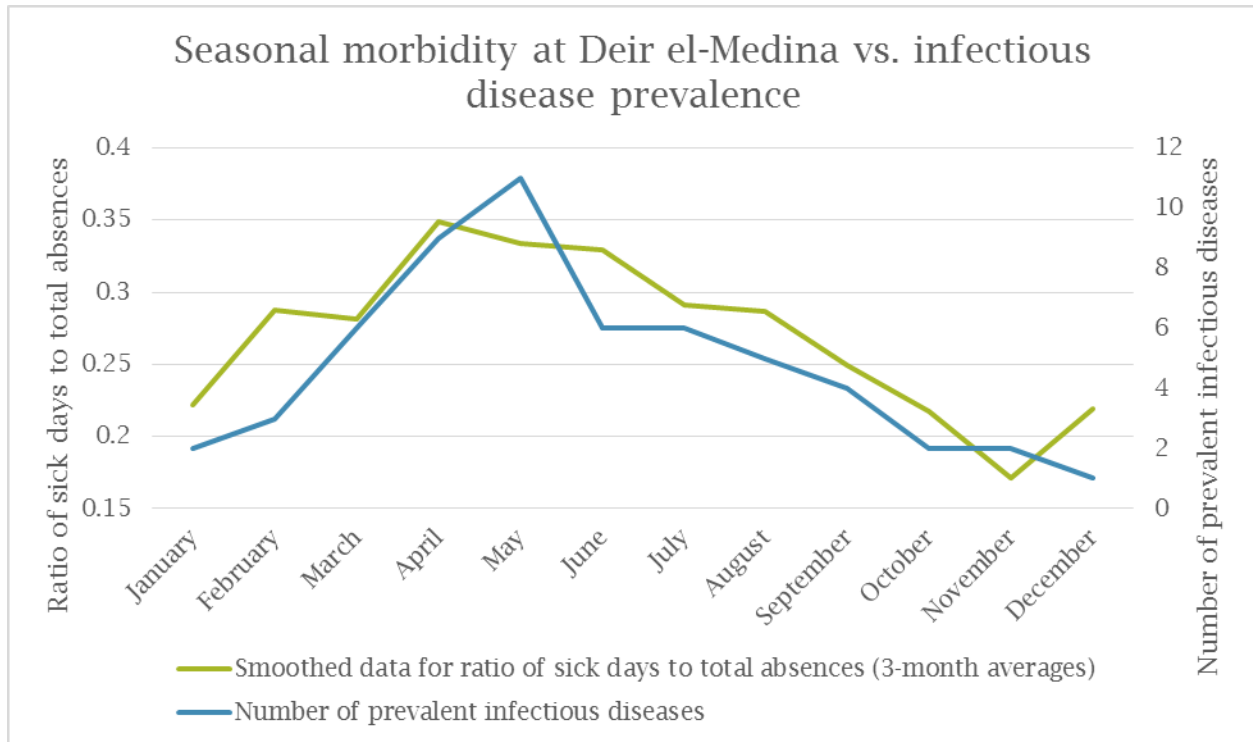


Figure 5.7 Seasonal morbidity patterns at Deir el-Medina in comparison to seasonal contours of infectious disease in Egypt from the 16th to early 20th centuries (based on Scheidel 2001, Table 1.19)

Comparative data from modern historical accounts also suggest that March and April are particularly dangerous times of the year. The seasonal prevalence of various infectious diseases during the modern era has been extensively documented by Western visitors to Egypt. For example, Sandwith found that bubonic plague was most virulent in March and April and least in November, rising in virulence again in December or January (Sandwith 1905). Scheidel evaluates these different accounts, and demonstrates that the number of diseases that are virulent are highest in May and

lowest in December (2001, 51-125), following the same seasonal distribution as the absence from work texts at Deir el-Medina (Figure 5.7).

Many of the bacterial, viral, and parasitic infectious diseases Scheidel documents using modern historical data are known to have been present in ancient Thebes based on studies of the soft tissue from elite and royal mummies. These studies have demonstrated the presence of smallpox (Leslie and Levell 2006), tuberculosis (Zink, Haas, et al. 2001; Zink et al. 2003), schistosomiasis (David and Garner 2003), malaria (Hawass et al. 2010), and possible diphtheria (Zink, Reischl, et al. 2001).

Without knowing the exact diseases affecting the population at Deir el-Medina, it is impossible to explain the underlying mechanisms affecting this seasonal distribution. Even modern studies of known pathogens are complicated by the many factors affecting seasonal infection including climate, rates of contact, and seasonal cycles of carriers such as mosquitos (for an overview, see Altizer et al. 2006). It is interesting to note, however, that illness did not peak around the annual inundation in the summer when temperature and flood levels are highest. The seasonal rise in virulence of infectious diseases prior to the inundation thus suggests that temperature, humidity, and flood levels were not the primary drivers for these infectious diseases.

This distribution may be complicated by the nature of the data itself; the absence from work records only document the sick days for males, the majority of which are young or middle adults. Women, children, and the elderly would not have been part of this working population. Seasonal distributions of illness may have been different for these groups as morbidity patterns can vary per disease based on age and sex.

Overall, the seasonal distribution of sick days points to infectious diseases as the primary cause of illness. The similar trends in morbidity patterns at Deir el-Medina during the New Kingdom and mortality rates in the Theban region during the Roman period suggest that these infectious diseases accounted for both short-term and fatal infections in Egypt. These patterns would have been exacerbated by contagious infection in the workforce, increasing the overall number of workmen who required simultaneous sick days.

5.6 THE SPREAD OF DISEASE AT DEIR EL-MEDINA IN YEAR 40 OF RAMESSES II

Contagion may have played a part for the majority of days where workmen were absent for illness; multiple individuals were sick in 52% of days with at least one absence due to illness. Due to the fragmentary nature of the texts, consistently tracing a development in absences which could be due to the sequential transmission of a disease is difficult. A circumstantial case can be made for the communication of an illness during the reign of Ramesses II in O. BM 5634.¹⁵⁵ In year 40, several workmen were sick for consecutive days during the majority of the *šmw* season, which would have fallen in late spring and early summer. The progression of their sick days can be easily visualized in Figure 5.8. First, *Mrj-w3st* fell ill from III *šmw* 5 to III *šmw* 17. The workmen took a seven day break during this time. At some point during this break, *Hr-m-wj3* also became ill, as when the workmen returned to work on the seventeenth, he was sick until at least IV *šmw* 8. Then, other workmen started to fall ill. First, *Nb-n-*

¹⁵⁵ Transcription in ~~Černý and~~ *Hieratic Ostraca*, 22 and 23, pls. LXXXIII and LXXXIV and Kitchen, *Ramesside Inscriptions III*, 515-525. An outline of contents in Helck, *Die datierten und datierbaren Ostraka*, 66-71. The workmen in this study are mentioned in the following lines: *Mrj-w3st* (verso 14), *Hr-m-wj3* (recto 5), *Nb-n-m3t* (verso 13), *Nfr-rnpt* (recto 20), *P3-sr* (verso 5), *P3-ħrj-pdt* (recto 21).

m3ꜛt was sick from III *šmw* 21 until IV *šmw* 26. Next, *P3-sr* and *Nfr-rnpt* both fell ill by IV *šmw* 4. Finally, the *swnw*, *P3-ḥrj-pd.t*, who was with the sick workman *Ḥr-m-wj3* during this time, fell ill himself during an unusually long break between IV *šmw* 9 and 23.

Date			Workman					
Month	Season	Day	<i>mrj-w3st</i>	<i>ḥr-m-wj3</i>	<i>p3-ḥrj-pd.t</i>	<i>nb-n-m3ꜛt</i>	<i>nfr-rnpt</i>	<i>p3-sr</i>
3	<i>šmw</i>	5	sick	working	working	working	working	working
3	<i>šmw</i>	6	free					
3	<i>šmw</i>	7	sick	working	working	working	working	working
3	<i>šmw</i>	8	sick	working	working	working	working	working
3 <i>šmw</i> 9 through 3 <i>šmw</i> 16			free					
3	<i>šmw</i>	17	sick	sick	with <i>ḥr-m-wj3</i>	working	working	working
3	<i>šmw</i>	18	working	sick	with <i>ḥr-m-wj3</i>	working	working	working
3	<i>šmw</i>	19	free					
3	<i>šmw</i>	20	free					
3	<i>šmw</i>	21	working	sick	with <i>ḥr-m-wj3</i>	sick	working	working
3	<i>šmw</i>	22	working	sick	with <i>ḥr-m-wj3</i>	sick	working	working
3 <i>šmw</i> 23 through 4 <i>šmw</i> 3			free					
4	<i>šmw</i>	4	working	sick	with <i>ḥr-m-wj3</i>	sick	sick	sick
4	<i>šmw</i>	5	working	sick	with <i>ḥr-m-wj3</i>	sick	sick	sick
4	<i>šmw</i>	6	working	sick	with <i>ḥr-m-wj3</i>	sick	sick	sick
4	<i>šmw</i>	7	working	sick	with <i>ḥr-m-wj3</i>	sick	sick	sick
4	<i>šmw</i>	8	working	sick	with <i>ḥr-m-wj3</i>	sick	sick	sick
4 <i>šmw</i> 9 through 4 <i>šmw</i> 23			free					
4	<i>šmw</i>	24	working	working	sick	sick	working	working
4	<i>šmw</i>	25	working	working	sick	sick	working	working
4	<i>šmw</i>	26	working	working	sick	sick	working	working
4 <i>šmw</i> 27 through 1 <i>3ḥt</i> 13			free					

Figure 5.8 Absences from O. BM 5634 in the third and fourth months of Shemu

While it is impossible to determine what caused their illnesses, the suggestion that the underlying cause was an infectious disease is supported by the following

observations. First, there is a clear progression in virulence; while the illness begins with just one individual, it gradually grows until at least four workmen are out sick simultaneously due to illness. Second, *Hr-m-wj3* may have directly communicated the illness to the doctor *P3-ħrj-pd.t*, since we know he was with the sick workman before *P3-ħrj-pd.t* too fell ill. Third, for each of the workmen mentioned above, their sickness lasted for at least three days, but likely much more as the entire recorded workforce took several long breaks during this time. Fourth, the nature of the illness is not explained for any of these absences. In O. BM 5634, the author occasionally mentions the place of the body affected (e.g., eyes or legs) when a workman is out sick. The lack of any explanation for the described sick days may indicate that these workmen were suffering from a non-specific ailment, such as an infection. Fifth, none of these workmen become sick again after the initial bout of illness. Finally, the entire workforce takes several long breaks during this period. This time off could have been related to the degree of illness in the workforce since at least 13% (5/38) of workmen were absent at one time. It is possible that the workforce had extra free time to combat the disease or in order to take care of sick family members.¹⁵⁶ Alternatively, some of these perceived free days could have actually been dates when the scribe himself was sick or caretaking,¹⁵⁷ and thus he was unable to record absences. In either case, the number of days without work was unusually high during this period; over the span of 51 days, only 15 were spent working.

¹⁵⁶ See chapter four for discussion on caretakers in the village.

¹⁵⁷ We know the scribe's wife was also ill during this time since *P3-ħrj-pdt* was absent from I *šmw* 25 to II *šmw* 8 to prepare medicine for her (In O. BM 5634, recto 21).

Out of these remaining 15 working days, the gang lost a total of 43 individual sick days.¹⁵⁸ These would have accounted for only one or two days of lost work for the entire workforce of 38 men. Given the numerous days of unrecorded work just mentioned, the impact of sickness may not have been significant on the broader progress of tomb decoration.

The impact could have been great on individual workmen, however, and especially on one side of the gang if more individuals are absent simultaneously due to illness. P. Ashmolean 1958.112 specifically discusses one such situation (Eyre 1984). In this text, the left side of the gang has progressed slower than the right as one workman has been consistently out sick, and the draftsman requests assistance to make up for decreased productivity. He even offers to split rations with the assistant. This suggests an expectation that both sides would maintain the same rate of work. This expectation would have effectively reduced the impact of illness on workforce productivity, but certainly would have forced temporary financial and physical burdens on individuals to maintain the rate of work.

What was the underlying force pressuring the workmen to maintain a specific level of production? Consistent visits from the vizier to inspect tomb progress were certainly a motivation. These visits could even come with bonuses for good work. In O. Cairo CG 25504, workmen were given several rewards by the vizier during the reign of Merneptah, presumably based on the vizier's approval of their progress (Helck 2002, 87-88).¹⁵⁹ Alternatively, in O. OIM 16991, the scribe specifically mentions the tomb's

¹⁵⁸ Calculated as the sum of absences due to illness per workman, per day.

¹⁵⁹ While this text references a specific event, it exemplifies the possibility of a reward based on work progress.

progress as proof that the vizier should pay the workmen their regular (likely overdue) rations (Wente 1961).

5.7 ONE WORKMAN’S BATTLE BETWEEN ILLNESS AND WORK

A close reading of one workman’s absences allows us to understand how these expectations on the workforce could have affected the well-being of individual workmen. The following detailed study of *Mr-Shmt*’s sick days in O. Cairo CG 25785 assesses how pressure on the gang may have compelled him to continue to work even when sick (Figure 5.9).

Year 3 3ht 4									
1	2	3	4	5	6	7	8	9	10
						sick	sick	off	off
11	12	13	14	15	16	17	18	19	20
in the valley	went to work but couldn't	in the village							
21	22	23	24	25	26	27	28	29	30

Figure 5.9 O. Absences of *Mrj-Shmt* in Cairo CG 25785

In IV 3ht 7 and 8 of year 3 of Amenmesse,¹⁶⁰ *Mr-Shmt* was sick and unable to work.¹⁶¹ The next two days the entire gang was off. When they returned to work on the eleventh, the scribe recorded that *Mr-Shmt* was in the Valley of the Kings. As his colleagues *K3s3* and *Hr-nfr* were specifically recorded as back to work during this time,

¹⁶⁰ This reign of Amenmesse is based on Helck, (2002, 112).

¹⁶¹ This may have been another case of a short-term infectious disease spreading in the workforce as *Mrj-shmt*’s colleagues *B3kj*, *Hr-nfr*, and *K3s3* were simultaneously ill on the seventh.

the scribe likely indicates that *Mr-Shmt* travelled to the workmen's huts on this day, but did not descend to work. Interestingly, for the next two days, the scribe writes that *Mr-Shmt* came, but could not work. This suggests that he descended to the valley, but he was too sick to work once arriving there. Subsequently, from the 14th until the 23rd, *Mr-Shmt* returned to the village and stayed there until the scribe indicates that he was well enough to work again on the 24th.

This 14 day period of *Mr-Shmt's* punctuated attempts at work while ill suggests that Deir el-Medina's workplace expectations would have impacted the overall morbidity patterns of the gang. First, these expectations would have worsened individual health. *Mr-Shmt's* attempts to work—descending and ascending the Valley of the Kings in the middle of his sickness—likely exacerbated his symptoms. Further, his time spent recovering in the workmen's huts would have limited his access to health care, as many of his family members would have been in the village. Second, these expectations would have increased the likelihood of contagion between workmen. If others worked through their illnesses like *Mr-Shmt*, they would have exposed the rest of the gang to diseases in constrained workspaces. Finally, these data suggest that the distribution of recorded sick days only represents a portion of those workmen who were sick, the rest of whom were able to work through their illnesses.


How do we reconcile the pressure for *Mr-Shmt* to work, when we compare this case to O. OIM 16973, a text mentioned in the previous chapter in which a workman was absent for five consecutive months? While still speculative, it is possible that this difference is due to diachronic change in the control of the workforce. The absences of *Mr-Shmt* occurred during the 19th dynasty, a period in which we see much more detailed administrative records as evidenced in the distribution of absence from work

texts. O. OIM 16973, on the other hand, dates to the 20th dynasty and thus may reflect the loss of not only administrative oversight, but also administrative control.

Essentially, the state's ability to drive labor decreased over time, coinciding with decreased government stability, impending labor strikes, and inconsistent rations.

5.8 SPECIFIC ILLNESSES IN THE ABSENCE FROM WORK RECORDS

The above examples are based on the entire corpus of sick days, the vast majority of which simply use *mr* to indicate that a workman was ill. In some cases, the scribe offers more detailed information to explain the kind of illness affecting a workman.

The most common reason given is the sting of a scorpion (*pzh n wh^ct*; ¹⁶²). This reason was given a total of seven times,¹⁶³ with two additional absences just explained as “bitten/stung.”¹⁶⁴ In all cases where absences are listed for the days following a scorpion sting, the workmen are not mentioned as being sick again. The nearest day off taken for illness is listed for *Rm* who was stung by a scorpion on year one of Siptah, 4 *3ht* 23 and sick again on 4 *3ht* 28. The lack of days off in between suggests that the two may not be related. Consequently, it seems that in general, scorpion stings could warrant only one day off from work.

Beyond scorpion stings, there are only 13 instances where the nature of the illness is given and these only occur in four ostraca: O. BM 5634, O. Cairo CG 25532, O.

¹⁶² For *pzh*, “to bite; to sting,” see TLA lemma 62220; Wb 1, 550.1-10; Lesko, Dictionary I, 182. For *wh^ct*, “scorpion,” see TLA lemma 48880; Wb 1, 351.1-2; Lesko, Dictionary I, 125.

¹⁶³ O. Ashmolean Museum 0174; O. Cairo CG 25517, verso 13; O. Cairo CG 25519, verso 6-7; O. Cairo CG 25521, verso 2-3; O. BM 5634, verso 7.

¹⁶⁴ O. Cairo CG 25517, verso 19; O. Varille 26, recto 15. This latter text is broken and could have included “of a scorpion.”

Cairo CG 25533, and O. Gardiner 37. On four days, eye ailments were the cause for absences: *Hwj-nfr* and *Nht-jmn* were sick for two days due to an ailment of the eyes (O. BM 5634).

In two absences, the reason for absence was listed simply as an illness of the leg or hand, while in one additional instance it is explained to be an illness of a hand that was burned (O. Cairo CG 25787). An absence is also listed for an illness in the bones (O. Cairo CG 25532). Finally, one absence is for an illness in the ears (O. Gardiner 37). For these cases, the duration of illness is difficult or impossible to determine due to incomplete dates and fragmentary records. Additionally, workmen may have also been too unwell to work if they were beaten as punishment for inappropriate behavior such as drunkenness (e.g., O. Cairo CG 25779).

This fragmentary information demonstrates that the nature of the illness was not required information in these absence from work records. Scribes recorded the kind of illness in only 13% (9/69) of absence from work texts and 3.7% (20/536) of recorded absences due to illness. This inconsistency suggests that recording the kind of illness was either an ad hoc decision by the scribe or only necessary in specific circumstances. The kinds of illnesses recorded are generally traumatic injuries that could have been sustained during work. It is possible that recording these particular injuries documented evidence for workplace injury, hence their scarcity in the overall record of absences from work.¹⁶⁵

The absence from work texts that do indicate a kind of illness primarily document illnesses with clear antecedents and a specific location of the wound, such as a burnt hand, a scorpion sting, or an ailment of the legs. None of these absences are

¹⁶⁵ See chapter seven for physiological evidence for traumatic injuries which is similarly rare.

explained by the disease agents or symptoms that were common in the medical texts. Perhaps then, some portion of the multitude of sick days which simply use *mr* represents ailments from these divine antecedents, as they would have affected the entire body and it was more difficult to determine their etiological disease agent.

5.9 CONCLUSIONS: INFECTIOUS DISEASE AT DEIR EL-MEDINA

Evidence from the absence from work texts demonstrates that the underlying seasonal distribution of sick days, which are highest in early spring and lowest in late fall, mirrors seasonal changes in infectious diseases documented in modern Egypt as well as mortality patterns in Thebes during the Roman period. Sick days in O. BM 5634 offer more specific evidence for contagious disease. The distribution of sick days offer circumstantial evidence for the contraction of one infectious disease by multiple members of the Deir el-Medina workforce. Though 13% of the workforce was out sick simultaneously, the overall time lost due to illness was significantly less than time taken off from work in general; in this case, sick days may not have significantly impacted productivity. On the other hand, in P. Ashmolean 1958.112, productivity was an issue, and the workmen supplemented the workforce with additional labor, albeit at the expense of one's own rations. At the most detailed level, *Mr-Shmt's* absences show that while he ultimately went home to the village, his movement to the workmen's huts and the Valley of the Kings demonstrates a commitment to attempting to work in the middle of his illness, one which invariably would have negatively impacted his health. Finally, while we do have a few examples of specific illnesses mentioned in the absence from work texts, these are often specified because the scribe could determine their location or they had a clear etiology. The vast majority of illnesses were then left

undescribed, perhaps as many sick days originated from infectious diseases which would have been more difficult to diagnose and affected the entire body.

These three levels of analysis on the absence from work texts coalesce to demonstrate that infectious diseases carried with them social and physical impacts on the workforce. While the government provided paid sick leave as well as a health care support network, such support was likely only offered to ensure progress on the tomb. When productivity was hindered, the workforce was expected to turn to its own support mechanisms to make up the deficit.

Further, the dominance of infectious diseases in the morbidity patterns of the workforce underscores the importance of medical care and family networks in healing and caretaking. We need to turn to the human remains, then, to understand how successful these treatments were in protecting and healing, before these infectious diseases turned fatal.

6 METHODS FOR OSTEOLOGICAL ANALYSIS

Osteological data for this research come from three unpublished sets of human remains stored in Theban tombs (TT) 6, 217, and 291 at Deir el-Medina. These data sets are derived from commingled remains dating from the 18th to 21st dynasty (approximately 1500 to 1000 B.C.E.). While the methods employed in this study mimic those used for studies traditionally focused on complete individuals (Buikstra and Ubelaker 1994; Steckel and Rose 2002), the analyses of these data sets are limited to those that can be done with commingled remains. As this is also the first study of the New Kingdom skeletal material at Deir el-Medina, the following methods contain both basic osteological observations such as inventories, age ranges, and sex estimates, as well as more descriptive information for future research, such as paleopathological observations. Overall, these data sets include (1) a detailed skeletal inventory, (2) paleopathological observations, (3) demographic profiles, (4) descriptions of oral health, (5) long bone metrics, as well as (6) a detailed description of the state of preservation.

6.1 DATA MANAGEMENT

I recorded all data using OsteoSurvey —a series of digital osteological data collection forms used on Android-operated mobile devices via Open Data Kit (ODK) Collect. I used an HP Touchpad in the field, then exported as comma-separated value files for analysis. I designed OsteoSurvey to follow standard methods in bioarchaeology (Buikstra and Ubelaker 1994) and bioarchaeological stress models (Steckel et al. 2002; Steckel et al. 2006), while also streamlining data entry to improve the overall quantity and quality of data recorded (Austin 2014). Both raw exported data

and processed data files are publically available online at the Digital Archaeological Record (tDAR) database (<https://core.tdar.org>) under the tDAR ID number 149376 and title, “Deir el-Medina Human Remains.”

6.2 NUMBERING

As these remains are commingled, I assign numbers to any discrete element, skull, or individual. I use a five digit number consisting of a two-digit year followed by a three-digit sequential identification number (e.g., 12005 was the fifth data entry from the 2012 field season). These numbers are written on each element and are recorded during data collection.

6.3 DATING

When discernible, remains are dated both to general period (i.e., New Kingdom, Third Intermediate Period, Late Period, Greco-Roman Period) as well as dynasty (i.e., 18th, 19th, 20th, 21st, 22nd). I use multiple criteria for determining these dates for each data entry. First, I date the remains based on mummification style following dating criteria established by other scholars as outlined in Table 6.1 (Aufderheide 2003; Cockburn et al. 1998; David 2008; Dawson and Gray 1968; Dodson 2000; Dunand and Lichtenberg 2006; Edwards and Smith 1938; Gray 1972; Ikram and Dodson 1998; Peck 1998; Strouhal and Vyhnánek 1979; Taylor 1996; Wisseman 2003; Zimmerman 1986).

Table 6.1 Mummification dating criteria

<i>Period</i>	<i>Mummification criteria</i>	<i>Works Cited</i>
<i>New Kingdom</i>	Hands placed over the pelvis	Cockburn et al. 1998; Ikram and Dodson 1998
	Bandages are not soaked in resin, making the mummies appear lighter in color (“white mummies”)	Cockburn et al. 1998; Dunand and Lichtenberg 2006

	Resin lining the body cavities	Ikram and Dodson 1998; Zimmerman 1986
	Incision parallel to the iliac crest on the left side	Aufderheide 2003; Dunand and Lichtenberg 2006; Ikram and Dodson 1998
	Painted linen eyes Lighter amount of resin resulting in mostly skeletonized remains (with the most skeletonized in the 18 th dynasty)	Ikram and Dodson 1998 Dodson 2000; Strouhal and Vyhnánek 1979
<i>T.I.P.</i>	Figure-eight wrapping style	Ikram and Dodson 1998; Peck 1998; Taylor 1996
	Hands placed over the pelvis	Cockburn et al. 1998; Ikram and Dodson 1998
	Visceral packets inside the body	Dawson and Gray 1979; Ikram and Dodson 1998; Peck 1998; Taylor 1996; Zimmerman 1986
	Vertical evisceral cut	Ikram and Dodson 1998; Taylor 1996
	Sawdust, resin-soaked linen, and mud subcutaneous stuffing	Cockburn et al. 1998; Dawson and Gray 1979; Dunand and Lichtenberg 2006; Ikram and Dodson 1998; Taylor 1996; Zimmerman 1986
	Yellow and red painted skin	Dunand and Lichtenberg 2006; Ikram and Dodson 1998
	Attached false eyebrows, eyes, and lips	Dunand and Lichtenberg 2006; Ikram and Dodson 1998
<i>Late Period and Greco-Roman Period</i>	Painted wrappings	Peck 1998; Ikram and Dodson 1998
	Uncircumcised	Cockburn et al. 1998
	Viscera left in the body	Dawson and Gray 1979; Ikram and Dodson 1998; Wisseman 2003
	Less dessication prior to pouring resin over the body, giving it a more lifelike appearance	Dunand and Lichtenberg 2006
	Bandages soaked in a darkened resin, making the mummies darker in color (“black mummies”)	Dunand and Lichtenberg 2006; Ikram and Dodson 1998
	Gilding	Dunand and Lichtenberg 2006; Ikram and Dodson 1998; Wisseman 2003
	Thinner bandages which are wrapped in geometric patterns	Dunand and Lichtenberg 2006
	Arms placed along the sides on the thighs or crossed over the chest	Ikram and Dodson 1998

As the tombs were extensively reused for burials during the Ptolemaic period, it is most important to differentiate between these later mummies and those from the New Kingdom and the early Third Intermediate Period. The most important difference is the sharp increase in the abundance of resin used during the mummification process after the Third Intermediate Period. Embalmers of later periods poured resin over the bodies in such excessive quantities that it gave the mummies a dark appearance and even impregnated the bones themselves (Figure 6.1; Andrews 1998, 8). As with other sites, these differences between Pharaonic and later period mummies are easily visible at Deir el-Medina.



Figure 6.1 Resin soaked lumbar vertebra dating to the Ptolemaic period

In addition to the mummification style, it is also possible to evaluate general differences between Pharaonic and later mummies by their associated linen. I base the dating of linen on chronological criteria used by previous scholars (Abdalla 1988; Allgrove-McDowell 1986; Germer et al. 1997; De Jonghe 1985; Hall 2001; Janssen 1995;

Janssen 1998; Kemp and Vogelsang-Eastwood 2001; Quirke and Spencer 1992; Riefstahl 1944; Tata 1986; Vogelsang-Eastwood 1990; Vogelsang-Eastwood 1992; Vogelsang-Eastwood 2000; Wisseman 2003). These are outlined in Table 6.2.

Table 6.2 Linen dating criteria

<i>Period</i>	<i>Linen criteria</i>	<i>Works Cited</i>
<i>New Kingdom and Third Intermediate Period</i>	Blue-striped borders	Altenmüller 1997; Quirke and Spencer 1992; Riefstahl 1944; Tata 1986
	Osiris cloths (specifically, 21 st dynasty)	Abdalla 1988; Vogelsang-Eastwood 2000
	Self-bands	Kemp and Vogelsang-Eastwood 2001; Riefstahl 1944
	Predominantly flax, s-spun and s-plied	Allgrove-McDowell 1986; Hall 2008; Kemp and Vogelsang-Eastwood 2001
	Predominantly warp-faced, tabby weave	Kemp and Vogelsang-Eastwood 2001
	Twisted knotted fringe (New Kingdom)	Janssen 1998
	Long twisted plied fringes (New Kingdom)	Janssen 1998
	Sewing thread is 2 s-pun, Z-plied	Allgrove-McDowell 1986; Kemp and Vogelsang-Eastwood 2001
<i>Greco-Roman Period</i>	Wool fabrics are represented in higher proportions	Vogelsang-Eastwood 1990
	Basket weave fabrics are represented in higher proportions	Vogelsang-Eastwood 1990
	Z-spun threads are represented in higher proportions	Wisseman 2003
	Patching of cloth	Vogelsang-Eastwood 2000

Similarly, it is most imperative to use basic criteria to differentiate between linen from the Pharaonic period with linen from later periods. Two criteria offer a basic means to differentiate linen: (1) weave and (2) spin/ply. During the Pharaonic period, textiles were predominantly warp-faced tabby weaves. They also tended to use s-spun and s-plied threads as evidenced in 98% of textiles from Amarna (Kemp and Vogelsang-Eastwood 2001, 60); z-plied threads would have been used for sewing

(Allgrove-McDowell 1986, 235; Kemp and Vogelsang-Eastwood 2001, 59). These observations are in line with textiles found associated with New Kingdom mummies at Deir el-Medina, where the vast majority of linen are warp-faced tabby weaves with s-spun, s-ply threads (Figure 6.2). The only z-spun threads found in the context of a New Kingdom mummy for this study were similarly used for sewing, and in one case, for sewing shut the primary visceral incision (Figure 6.3). Linen from the Greco-Roman period, on the other hand, tend to have a greater distribution of basket weave and z-spun thread (Vogelsang-Eastwood 1990). While warp-faced tabby weave with s-spun, s-ply threads are still present in Greco-Roman material, they do not dominate as clearly as they did during the Pharaonic period. When possible, I also note and photograph decorated linen fragments for future analysis and more refined dating by a textile specialist. Many of these are blue-striped bordered pieces (Figure 6.4), common in the New Kingdom and Third Intermediate period, but still available in later periods as well (Roveri 2001, 30).



Figure 6.2 S-spun, s-ply threads (left)

Figure 6.3 Z-spun threads for sewing shut the evisceral incision (center)

Figure 6.4 Blue-striped bordered textile (right)

Finally, I identify and compare artifacts associated with the remains to analogous finds from Deir el-Medina and the broader Theban region in order to determine possible and likely periods. Diagnostic artifacts used to assist with dating the human remains at Deir el-Medina are described in section 6.8 below. This discussion also includes the estimated date and context of reference artifacts.

Each of the tombs pose different issues for dating the human remains. The most problematic of the three tombs was TT6. The extensive commingling of remains in this tomb made it necessary to date each element individually based on the associated linen and mummification style. On the other hand, TT217 includes provenanced individuals, and thus while dating techniques are applied for verification of the dating criteria, the final assumed date is based on the original provenance. Finally, TT291 includes a commingled assemblage from the same Ramesside tomb. While all material in this tomb is dated individually, during analysis I consider all remains of unknown period to date between the 19th and 21st dynasty as none of the artifacts, mummification styles, or linen from this assemblage suggest an earlier or later date.

For each data entry, I use three dating fields. First, I designate all *possible* periods matching the dating criteria (i.e., New Kingdom, First Intermediate Period, Late Period, Greco-Roman Period), with multiple selections allowable. Then, all *impossible* periods are selected using the same parameters as above. Finally, when it is possible to specify further, I record the *most likely* period and dynasty.

6.4 DEMOGRAPHIC DATA

6.4.1 Aging

I base methods for aging on those outlined by Buikstra and Ubelaker (1994). Specifically, methods for aging adults include observations on cranial suture closure (Meindl and Lovejoy 1985), occlusal surface wear (Walker et al. 1991), pubic symphyseal phasing (Brooks and Suchey 1990; Todd 1921), and auricular surface phasing (Lovejoy et al. 1985). Age estimations for skulls and os coxae include the following broad age categories: juvenile (under 20), young adult (20-35), middle adult (36-50), and old adult (over 50).

I record minimum and maximum estimates for juvenile ages based on dental development (Ubelaker 1989), epiphyseal fusion (Scheuer and Black 2004), and diaphyseal length (Ubelaker 1989). Individual elements are recorded as juvenile or adult based on epiphyseal closure, though if recorded as adult, no additional aging estimate is provided. As age estimates for epiphyseal union, dental development, and diaphyseal lengths are based on other populations, these ages should be taken only as initial estimates. Consequently, for analysis, all juveniles are categorized as being infant (under 3), child (4-11), or adolescent (12-20).

6.4.2 Sexing

The following categories are used when estimating sex for adults: definitely male, probably male, indeterminate, probably female, or definitely female. Sex estimates for the os coxae and crania follow non-metric observations outlined by Buikstra and Ubelaker (1994). For individual long bones (i.e., tibiae, femora, and humeri), univariate and multivariate discriminant functions based on post-cranial metrics are used for sex estimation. Multivariate functions follow previously

established methods for other populations (France 1997; Spradley and Jantz 2011), while univariate statistics use estimates specifically for Deir el-Medina following methods for determining sample-specific sectioning points (Albanese et al. 2005). Sex estimates are attributed as definitely male or female for long bones when all metrical tests agreed. When the majority of tests agree, I record long bones as probably male or female. When the tests are bifurcated between male and female, I designate the element as indeterminate.

Sample-specific estimates based on univariate discriminant functions have been demonstrated to have similar accuracy to functions developed for samples with known sex, so long as the sample size is larger than 40, the sample has less than a 1:1.5 sex ratio, and the metric being used is a reliable indicator of sex (Albanese et al. 2005). Consequently, I am using only those metrics that have been demonstrated to be the most reliable indicators of sex in previous studies of metric sex determination for the humerus, femur, and tibia (Dittrick and Suchey 1986; France 1997; Sakaue 2004; Spradley and Jantz 2011; Steyn and ~~France 1997~~ ^{France 1997} of these metrics, their published reliability, and sample-specific sectioning points for the New Kingdom remains at Deir el-Medina, see Table 6.3.

Table 6.3 Sample-specific univariate long bone metrics for sex determination (following Albanese et. al 2003)

Element	Metric	Measurement Published Accuracy					Deir el-Medina Sectioning point (mm)
		Dittrick and Suchey 1986	France 1997	Sakaue 2004	Spradley and Jantz 2011	Steyn and İşcan 1997 and 1999	
Femur	Epicondylar breadth	86%	92%	91%	88%	91%	76
	Head diameter	89%	93%	91%	88%	86%	43
Tibia	Proximal epiphyseal breadth	n/a	n/a	94%	90%	87%	71
	Transverse diameter at the distal epiphysis	n/a	n/a	89%	75%	89%	47

<i>Humerus</i>	Epicondylar Breadth	85%	85%	n/a	87%	89%	58
	Head diameter	89%	91%	n/a	83%	88%	41

6.4.3 Minimum Number of Individuals

The minimum number of individuals (MNI) is assessed separately for each tomb. Whereas this value is relatively straightforward in TT217, as this tomb contains mostly complete individuals, it is more complicated for the other tombs. In the case of TT6, each chamber is assessed separately. For TT290/291, the MNI is calculated based on the entire tomb. The MNI is calculated based on the most frequently repeated element, with consideration of any age and sex information that could be recorded per data entry. For fragments, I also record features and shaft completeness in order to include them in the assessment following previous research on commingled remains (Fox and Marklein 2014, 38-39).

6.5 MODELS OF SYSTEMIC STRESS

Methods and modes of analysis of stress will follow the protocol established for the Western Hemisphere Project (Steckel et al. 2002) as well as using any supplementary images to clarify scoring as developed for the later Data Collection Codebook (Steckel et al. 2006). This allows comparison with broader osteological collections, including over 12,000 data entries published online for analysis of human remains from the Western Hemisphere Project.¹⁶⁶

The following outline provides the methods for the seven indicators of stress used in both the Western Hemisphere Project and the Global History of Health project,

¹⁶⁶ The Western Hemisphere Database is published online as an Excel file at <http://global.sbs.ohio-state.edu/cd-contents/WH-Database.xls>.

along with any necessary modifications to the scoring systems for the analysis of commingled remains at Deir el-Medina. I additionally note when differences exist between scoring systems used in the Western Hemisphere Project (Steckel et al. 2002) and the Data Collection Codebook of the Global History of Health Project (Steckel et al. 2006). I do not utilize the overall Health Index scoring system, as this system requires the analysis of complete individuals for comparative scoring. Instead, comparisons with other populations are based on those criteria using individual elements such as the rates of tibial infection.

6.5.1 Adult Stature Estimation

Stature estimation in both the Western Hemisphere Project and the Global History of Health project is based on the ratio of achieved height to potential height for a population using the maximum femur length to calculate stature. The maximum femur length is defined as, “the distance from the most superior point on the head of the femur to the most inferior point on the distal condyles to the nearest whole millimeter” (Steckel et al. 2006, 26). The measurement for maximum femur length is taken using an osteometric board. As this indicator of stress is based on the femur specifically, it can be used for both commingled assemblages and complete individuals.

Metrics for potential height in the Global History of Health Project are based on estimates made by Maresh (1955). This publication is not ideal for Egyptian populations, and consequently both the calculation for stature estimation (Raxter et al. 2008) and the comparative data for potential height use research that was specifically based upon Egyptian stature (Raxter 2011). This research offers the added benefit of

data comparable to Deir el-Medina, including royal workmen's communities in Giza and Amarna.

6.5.2 Linear Enamel Hypoplasias

Linear enamel hypoplasias (LEH) develop in early childhood¹⁶⁷ when the body reduces the production of enamel due to increased periods of generalized stress (Duray 1996). They appear as linear bands on the crown (Figure 6.5) which correspond to the time when stress impacted the development of a tooth's enamel. Multiple hypoplasias on one tooth correspond to multiple discrete periods of stress. They primarily occur on the incisors and canines (Goodman and Rose 1990, 87). Consequently, they are normally documented for these teeth when a sufficient amount of the crown (more than 50%) is available for observation. LEH are associated with a variety of forms of stress including both infectious disease and malnutrition. I use the scoring system for LEH from the *Data Collection Codebook* (Steckel et al. 2006, 15-16), which is the same as the system used in the Western Hemisphere database. As the Western Hemisphere database only records LEH for maxillary incisors and mandibular *or* maxillary canines, data for commingled material can be easily compared to complete individuals.

¹⁶⁷ From prenatal to seven years (Goodman and Martin 2002, 23).



Figure 6.5 Linear enamel hypoplasia

6.5.3 Cribra Orbitalia and Porotic Hyperostosis

Cribra Orbitalia is the presence of pitting in the roofs of the eye orbits (Figure 6.6) caused from expansion of the diploë into the outer table. Porotic hyperostosis similarly represents expansion of the diploë in the cranial vault, but in this case, the resulting pitting is seen in the posterior bosses of the parietals (Figure 6.7). El-Najjar and colleagues (1976) suggested these expansions were due to iron-deficiency anemia, which requires bone marrow expansion to accommodate for increased red blood cell production and is seen in areas where the overlying outer table is thinnest. Stuart-Macadam (1987) found close correlations between clinical examples of anemia and porotic hyperostosis to support the anemia hypothesis, but suggested that the etiology of iron-deficiency anemia in these cases was not due to low levels of iron in the diet, but rather was a defense mechanism due to increased pathological stress (1992). Recent research has also suggested that iron-deficiency anemia alone is not a viable etiology for expansion of the diploë and that cribra orbitalia and porotic hyperostosis can result from alternative etiologies (Walker et al. 2009) such as haematogenous infections and excessive blood loss (Brickley and Ives 2008, 3). In all suggested causes, the underlying mechanisms suggest a negative impact on overall health status, and

thus both porotic hyperostosis and cribra orbitalia are considered in this study to be indicators of general stress.

The methods for observing both cribra orbitalia and porotic hyperostosis follow those outlined in the *Data Collection Codebook* (R. H. Steckel et al. 2006, 13). This data set is comparable with those recorded in the Western Hemisphere database as the overall scoring between the two methods is generally the same (1=absent; 2=present, but minimal; 3=gross lesions), despite slightly different terminology (e.g., definitions of score two). Observations for cribra orbitalia and porotic hyperostosis can be compared between commingled remains and complete individuals directly.

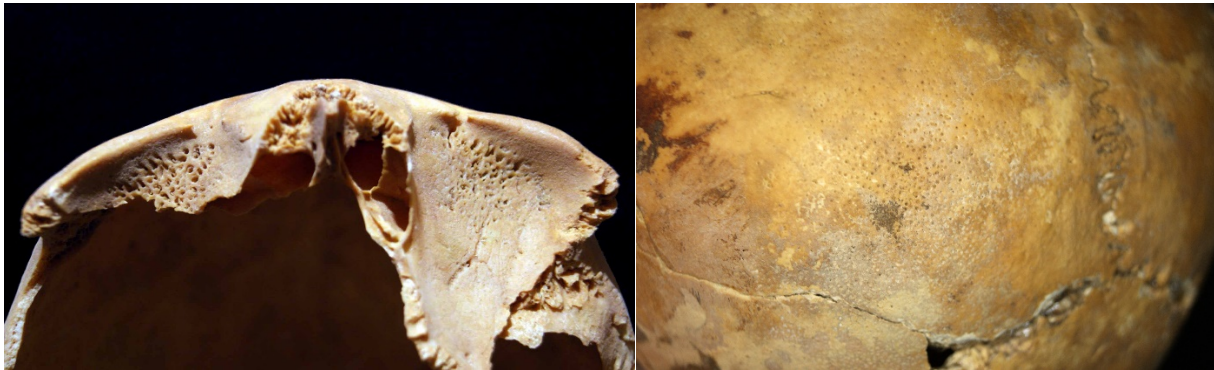


Figure 6.6 Cribra Orbitalia
Figure 6.7 Porotic Hyperostosis

6.5.4 Dental Health

Dental health is included in this study as it has several implications in health status; dental health can indicate the nature of one's diet, periodic episodes of stress in the past, and the rate of oral infections in the population. It also offers data comparable between individuals of different sexes and can offer a means for additional aging criteria.

6.5.4.1 *Ante-Mortem Tooth Loss*

Ante-mortem tooth loss (AMTL) can result from a variety of processes including caries, tooth wear, and periodontitis (Steckel et al. 2006, 15). It is differentiated from post-mortem tooth loss by the presence of healing along the edges of the bone and in the crypt. In this study, teeth are inventoried as: unerupted; absent with open crypt and no healing; absent with partially healed crypt; absent with fully closed crypt; present; or unobservable. Ante-mortem tooth loss is calculated as the ratio between the total number teeth recorded as absent with partially or fully closed crypts against the total recorded (including post-mortem tooth loss). Though this scoring system differentiates the amount of healing present for AMTL, the combined values of partially and fully healed teeth lost ante-mortem allows for comparison with the values recorded in the Western Hemisphere Database.

6.5.4.2 *Caries*

Dental decay results from bacterial infection in the mouth that demineralizes the tooth leaving a cavity (Figure 6.8). The presence of carious lesions (cavities) is related to multiple factors including oral hygiene, coarseness of the diet, and sugar content in food. Cavities were observed for all adult teeth following Buikstra and Ubelaker (1994, 55). This method not only specifies the absence or presence of a cavity, but also its location on the tooth. These are then compared to data from the Western Hemisphere Database through calculating the overall percent of carious teeth (Steckel et al. 2002, 87-88).



Figure 6.8 Carious lesion

6.5.4.3 Calculus

Calculus is the accumulation of calcium deposits on the teeth. Calculus buildup is also linked to oral hygiene and diet (White 1997). The scoring system for calculus is based on the images and descriptions provided by Buikstra and Ubelaker (1994, 56). The Western Hemisphere Database does not contain calculations for rates of calculus in the population, but such information is still recorded in research on human remains in related publications (Higgins et al. 2002).

6.5.4.4 Tooth Wear

Tooth wear is the result of three distinct processes: attrition (natural wear between teeth), abrasion (wear between teeth and foreign substances), and erosion (chemical destruction of teeth from acidic content).

The rate of tooth wear also offers information about dental health. It can suggest the general coarseness of the diet (Rose and Ungar 1998), as well as determining age-at-death for broader categories, such as differentiating a young adult, who shows no wear on an erupted third molar (Walker et al. 1991). Tooth wear can also be indicative of specific daily activities using dentition (e.g., Waters-Rist et al. 2010). The amount of wear may be useful in determining limitations in the efficacy of

remaining dentition for an individual by the time of death. I assess molar wear using the methods outlined in the *Data Collection Codebook* (Steckel et al. 2006, 18) which are modelled on Smith (1984). While molar wear was not collected in the Western Hemisphere Database, this data set is useful for comparison with recently studied collections of human remains within Egypt.

6.5.4.5 Abscesses

Abscesses are primarily caused by dental decay, excessive tooth wear, or other dental processes leading to bacterial infection in the dental pulp. These infections then affect surrounding bony tissue, creating openings in the maxilla or mandible which create a channel from the pulpal infection to the surface of the bone. Abscesses are painful and potentially life threatening —they make it difficult to eat while simultaneously making the individual more vulnerable to disease (Steckel et al. 2002, 88).

I record the location of the abscess based on the nearest tooth and the total number of abscesses per individual, allowing comparison with the Western Hemisphere Database and the *Codebook*. I differentiate abscesses from natural alveolar thinning by the presence of active bony response along the edges of the lesion.

6.5.5 Trauma

I record the absence or presence of traumatic lesions for each element. When a break is present, I record its location on the element, its size, its type (Lovell 2008, Table 11.1), the extent of healing (Lovell 2008, Table 11.2), and the adequacy of alignment (Steckel et al. 2002, 91). Ante- or peri-mortem breaks are differentiated from post-mortem breaks as the former will show evidence for healing, a matching color between the break and surrounding bone, and the nature of the break itself (e.g., bone

tear, plastic deformation, or a break-away notch as discussed in Kimmerle and Baraybar 2008; Pechníková et al. 2011). As the Western Hemisphere Database records breaks based on the region of the body in which they are found (e.g., arm, leg, face), I can compare the frequency of breaks found in the commingled remains at Deir el-Medina to these broader categories (Steckel et al. 2002, 91).

6.5.6 Occupational Stress

I assess occupational stress via degenerative joint disease (DJD) of the vertebrae and major joints. I record DJD, also referred to as osteoarthritis (OA), for all joints following scoring suggestions provided in the *Data Collection Codebook* (Steckel et al. 2006, 31–33). DJD is only recorded when the presence of both marginal osteophytosis and change to the joint surface (i.e., pitting, new bone formation, or change in contour) is visible, as osteophytosis alone may not be a reliable indicator of joint destruction (Rogers and Waldron 1995, 43–44). Similarly, observations of vertebral osteophytosis—marginal lipping of the vertebral bodies due to joint stress—are made using the scoring criteria described in the Western Hemisphere Project (Steckel et al. 2002, 90). As this method asks for scores based on the most extreme vertebrae exhibiting pathology, I am not able to compare overall rates of osteophytosis with the Western Hemisphere database. I can, however, compare relative overall scores of the lumbar, thoracic, and cervical vertebrae.

Observations for DJD were recorded in the Western Hemisphere Project by joint region, so while no direct comparison of the rates of DJD is possible using commingled elements, I can still compare the relative rates of DJD between these different regions of the body for the entire sample.

6.5.7 Periostosis and Infection

Periostosis (I use the term periostosis in place of the more common periostitis for reasons outlined in Grauer 2008, 62) is the process of reactive periosteal bone deposition, often the result of an injury to the periosteum or osteomyelitis —infection of the bone (Steckel et al. 2002, 89). Bisymmetrical distribution of periostosis suggests hematogenous infection because the blood is spreading infection evenly throughout the body. Periostosis found near fractures is indicative of an osteal reaction to the traumatic injury itself. In this latter case, the periostosis is considered to be due to traumatic injury. When no traumatic injury is visible near the periostosis, I assume the underlying reason for the osteal reaction is inflammation due to infection, as this occurs in the majority of cases (Steckel et al. 2002, 89).

Periostosis is recorded for all long bones using the images and scoring system from the *Data Collection Codebook* (Steckel et al. 2006, 30–31). Data from the Western Hemisphere Database were recorded separately for tibiae and combined for all other elements of an individual. Consequently, only scores for tibial periostosis are comparable with data from the Western Hemisphere Database.

6.6 PALEOPATHOLOGICAL DESCRIPTION

The general stress model offers comparable information about health status at the population level, but does not diagnose diseases that may be evidenced in the human remains. In order to facilitate future paleopathological study, I record macroscopic observations of any abnormal bone formations noted while analyzing the remains. As Grauer points out, macroscopic observation is the standard way in which researchers begin to collect paleopathological data on a skeletal series, and it remains

the means for most identifications until time and resources allow for additional lines of inquiry such as aDNA research (2008).

Following recommendations for caution and standardization of terminology by a variety of scholars (Grauer 2008; Rose et al. 1991; Roberts and Connell 2004), I use standardized terminology to describe the location and nature of the bone tissue. The objective for these descriptions is not in all cases to provide a definitive diagnosis, but rather to allow future scholars to assess the lesions for themselves to come to their own diagnoses as recommended by Buikstra and Ubelaker (1994, 107).

The descriptions I use for potentially paleopathological remains are based on recommended terminology by Lovell (2000, 221). Specifically for pathological lesions, I describe:

1. the anatomical location of the lesion in terms of element, location within the element, and extent of the lesion;
2. the type of lesion (e.g., cleft, perforation, deposit, spicules);
3. the nature of the bone in and around the lesion (e.g., woven bone, cortical bone, homogenous, eburnated);
4. the margin of the lesion and its contours;
5. photos taken of the lesion.

Using these descriptions, I also offer preliminary identifications of diseases when possible, based on differential diagnoses provided in paleopathological reference volumes (Aufderheide et al. 1998; Barnes 2012; Ortner 2003; Pinhasi and Mays 2008; Waldron 2008), major radiology references (Catriota-Scanderbeg and Dallapiccola 2005; Resnick 1996), as well as supplementary specialized publications (e.g., Kaufman et al. 1997). Pathologies are also compared with the comprehensive research slide

collection of Ortner and the Smithsonian Institute¹⁶⁸ as well as the online database for the archive collections at the Royal College of Surgeons of England (SurgiCat).¹⁶⁹ Ortner slides are footnoted throughout this text using both their current numerical designations and their current URL (e.g., Ortner [200-230](#)). Catalog items from the Royal College of Surgeons of England are similarly designated with their accession number (e.g., SurgiCat RCHC/P 137).

In most cases, a concrete diagnosis is impossible as the majority of remains are commingled, but it may be possible to identify the broader disease category. Consequently, I designate the most likely disease category for each example based on the twelve outlined by Ortner (2003). As Ortner points out (2011), these categories represent artificial constructions designed to aid in understanding the distribution of diseases, even though in some cases they can mislead as the etiology (underlying cause) and pathogenesis (mechanisms in the body) of the disease actually belong in separate categories. For example, actinomycosis, a disease caused by a bacterium that manifests like a fungus (mycosis), is grouped based on its pathogenesis, rather than its etiology. Alternatively, many diseases have complex etiologies which transcend multiple categories such as erosive arthropathies which require both the congenital predisposition and presence of an infectious agent to become pathological (Resnick 1996, 271-272). Furthermore, in some cases modern research cannot yet explain what category to which a disorder should belong (hence, the presence of a miscellaneous category in Ortner's typology). Despite these complications, the use of disease

¹⁶⁸ Made available online at http://global.sbs.ohio-state.edu/european_module.htm through NSF grant SES-0138129 by Richard H. Steckel, Clark Spencer Larsen, Paul W. Sciulli and Phillip L. Walker, "A History of Health in Europe from the Late Paleolithic Era to the Present" (Mimeo, Columbus, Ohio, 2002).

¹⁶⁹ You can find this at <http://surgicat.rcseng.ac.uk/>.

categories offers a way we can classify paleopathological tissue, without running the risk of preemptive diagnosis.

It should be noted that since the majority of human remains at Deir el-Medina are commingled, and thus do not represent complete individuals, many diagnoses are impossible. In other words, while a single element may exhibit pathological changes associated with a disease, a firm diagnosis is unfortunately unlikely without corroborating evidence from other articulated elements. Additionally, further studies specifically focused on pathology for these remains could likely result in additional diagnostic identifications as the observations mentioned here are based on those abnormalities noticed by myself, and certainly do not represent the entire breadth of possible pathological changes to the human remains at Deir el-Medina.

6.7 STATISTICAL ANALYSES

I analyze these data sets by comparing differences between subgroups. For continuous observations, such as long bone metrics, I use averages to compare subgroups using a two-sample one-tailed t-test in conjunction with a two-sample F-test to determine equal or unequal variances. I compare nominal data sets using Fisher's exact tests and chi-squared tests. Fisher's exact tests are used when sample sizes are insufficient for a chi-squared test as the Fisher's exact test, as the name implies, offers exact p-values even with small samples. To determine the necessary size for a chi-squared test, I conduct post-hoc power analyses with an expected power of 80% or higher for statistically significant results. An alpha level of .05 is used for all tests. I perform all statistical tests on Stata IC 13.1 for Windows. Probabilities are reported in the text and contingency tables and t-tests are provided in Appendix B.

6.8 MATERIALS

This study includes a total of 1,058 data entries recorded during fieldwork in 2012-2014 from Theban tombs 6, 217, and 291. The New Kingdom human remains currently stored at Deir el-Medina were originally excavated by Bruyère who documented their existence in his extensive journals and published reports. They were returned to the tombs during his missions, though they were never formally studied by an osteologist. As each of the tombs offer very distinct data sets, I describe the nature of each assemblage separately below.

6.8.1 Remains found in TT6

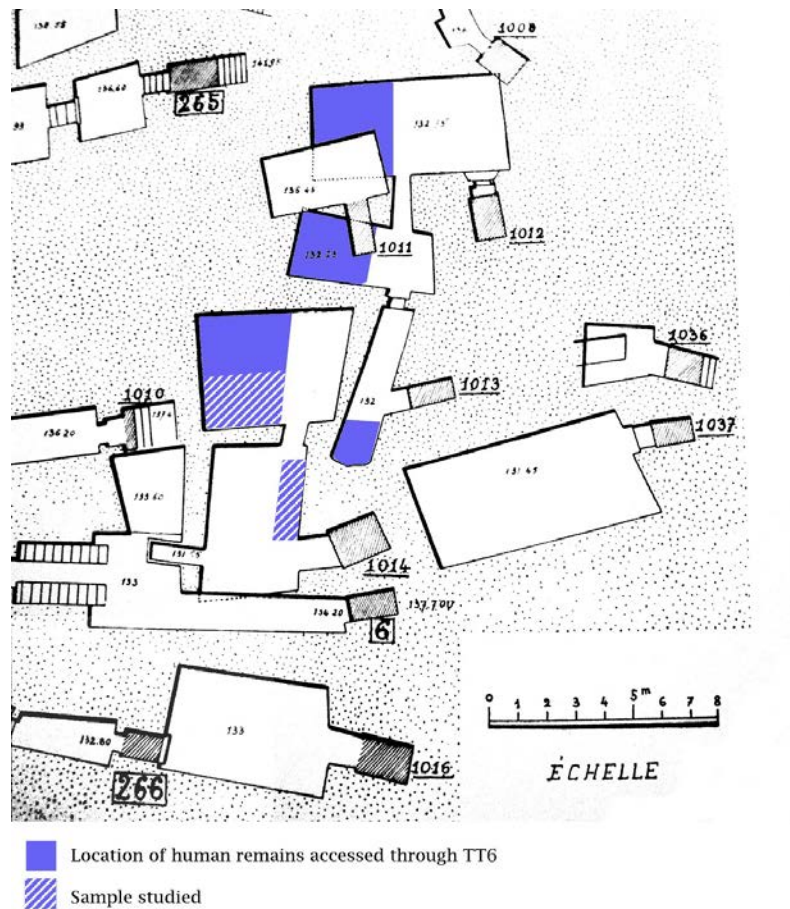


Figure 6.9 Plan of TT6 and associated caves with the locations of the human remains (modified from Bruyère 1926, Plate III)

TT 6 contains the highest quantity of human remains of all of the tombs studied at Deir el-Medina, but unfortunately, they are also in the worst condition. The remains are highly fragmentary, exposed to rodent and insect activity, and in varying states of preservation. The exact minimum number of individuals is indeterminable at this time as study in this tomb only includes a subsample of the remains, but I estimate that it is at least 250 based on the density and extent of material. They come from a series of caves which communicate through a broken wall to the north of the entrance to TT6 (Figure 6.10), and thus do not likely represent remains originally intended to be buried here. They occupy four separate chambers, and are commingled and piled heavily on the Western side of the tomb (Figure 6.11). They were found like this during Bruyère's excavations of TT6 (Bruyère 1926, 32), and thus were commingled and disturbed prior to the 1920s.

The human remains in this tomb represent the broadest chronological range of any tomb studied. While some skeletal material and linens showed relatively little use of resin during the mummification process, others are so impregnated with resin that it still encapsulates some of the bone, indicating a Greco-Roman mummification style. Additionally, typical New Kingdom pottery (Figure 6.12)¹⁷⁰ and linen (Figure 6.13)¹⁷¹ suggest Pharaonic use, while fragments of painted linen (Figure 6.14) and heavier basket-weave cloth with patching (Figure 6.15) are diagnostic of the Greco-Roman period. The heavy amounts of commingling and the presence of remains from multiple time periods suggest these remains could have been assembled to make room for additional burials or as a large looter's cache. Consequently, as the assemblage clearly

¹⁷⁰ See comparable ceramic from Deir el-Medina (Nagel 1938, 84, #23).

¹⁷¹ Some linen fragments in this tomb had diagnostic features dateable to the New Kingdom including twisted knotted fringes; long, twisted fringes; and rolled hems with whipping stitches.

does not belong to any one period of use, each data entry requires individual assessment for dating.

Given the extent of remains in this tomb, I could only analyze a sample of the total remains; this sample includes all of the remains in the first chamber and remains from the southeastern and southwestern quadrants of the second chamber (see Figure 6.10). In total, there are 385 data entries for this tomb, 63 of which are excluded from this study as they date to the Greco-Roman period. Of those remaining, there is a minimum of 72 individuals in this sample from TT6.



*Figure 6.10 Commingled remains on the Western side of TT6 (left)
Figure 6.11 New Kingdom pottery in TT6 (right)*



Figure 6.12 Pharaonic linen in TT6 (left)

Figure 6.13 Painted linen fragment from TT6

Figure 6.14 Basket-weave cloth from TT6

6.8.2 Remains found in TT217

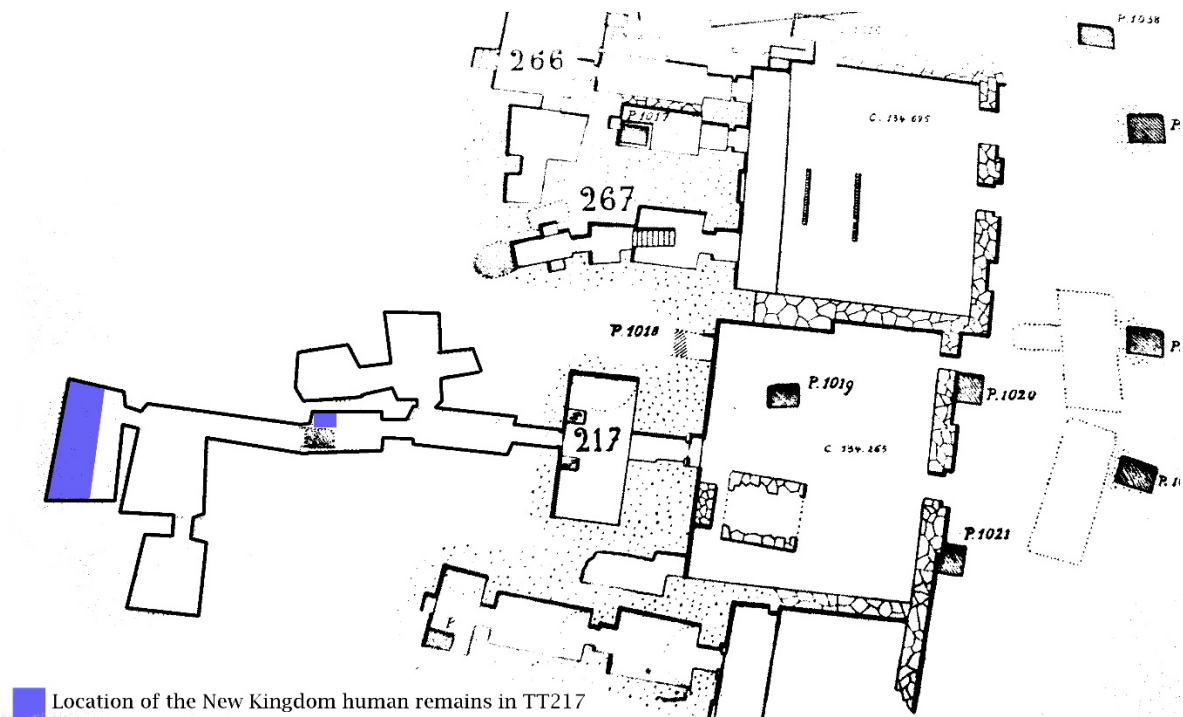


Figure 6.15 Locations of human remains in TT217 (modified from Bruyère 1926, plate II)

New Kingdom human remains in TT217 were found in the main corridor of the tomb as well as along the western side of the tomb's small, undecorated burial chamber (Figure 6.16). None of these human remains, however, originated from TT217.

Rather, they were placed there for storage by Bruyère's team during their excavations. For the majority of these individuals, Bruyère included identification cards with information about their original context (Figure 6.17). All identified remains come from tombs of the 18th dynasty, both in the Western and Eastern necropoleis. As the Eastern necropolis may not actually relate to the villagers of Deir el-Medina (Pierrat-Bonnefois 2003), these individuals were excluded from this study. The remains placed in this tomb seem to have been organized by period, as Roman mummies were found in the initial entry way of the tomb as well as the small antechamber to the burial chamber. All unmarked remains in the burial chamber, on the other hand, had mummification styles, artifacts, and linen associated with the Pharaonic period; specifically, the extremely skeletonized remains date to the 18th dynasty when individuals from Deir el-Medina were simply wrapped without additional mummification treatments (Dodson 2000, 98-99). There are only 62 data entries for this tomb, but this includes the highest quality data with eight complete individuals from known contexts. The minimum number of individuals for TT217 is 36.



Figure 6.16 Bruyère's identification card of Nebu

6.8.3 Remains found in TT290/TT291

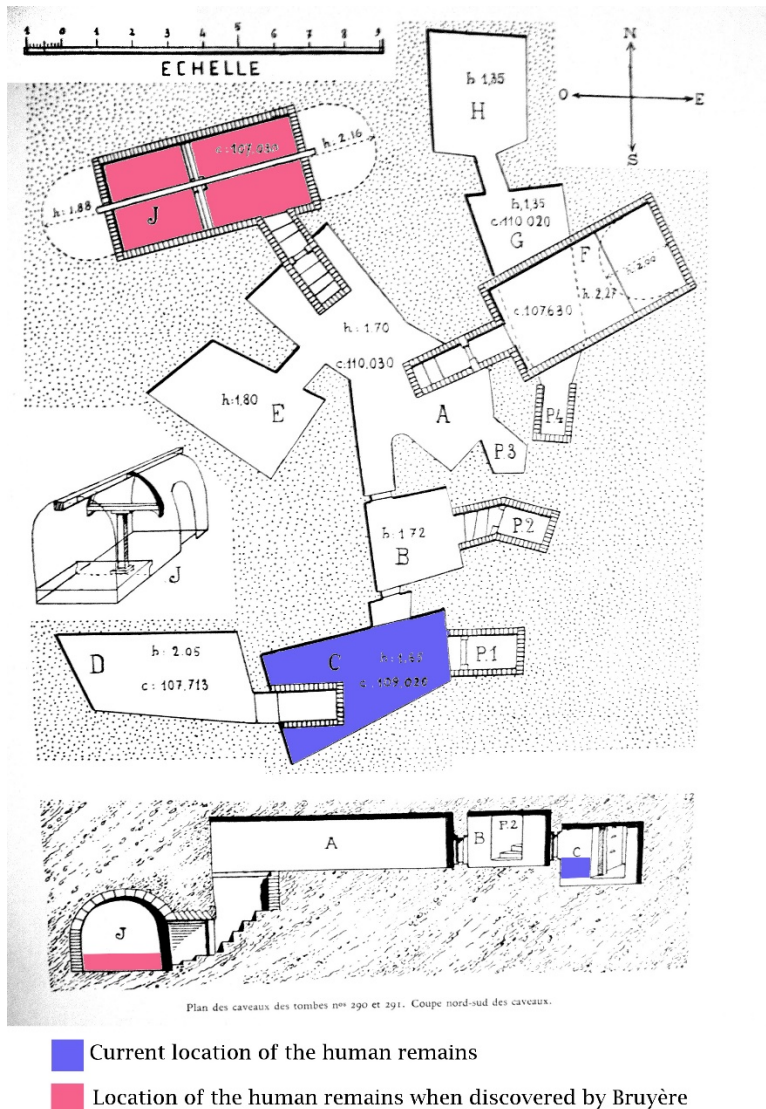


Figure 6.17 Plan of TT290 and TT291 with the location of the remains (modified from Bruyère 1925, plate VII)

This assemblage represents the majority of human remains used in this study (n=608). In 2012, these remains were found in the antechamber of the tomb of Nakhtmin (Figure 6.18) which was first excavated by Bruyère in 1922, and was published as part of a monograph on both the tombs of Iry-Nefer/TT290 and Nakhtmin/TT291 (Bruyère and Kuentz 1926). Artifacts and historical documentation of the two tombs, however, suggest that the remains in fact belong to the burial chamber

of Iry-Nefer (TT290). A newspaper dating to February 28, 2004 was found wrapping the remains, suggesting they were likely moved during preparation for the public exhibition of this tomb which communicates with TT291. This supposition is further supported by a stone ostracon painted with the name of Iry-Nefer (Figures 6.19 and 6.20) found next to the remains, fragments of wall decoration among the remains which match the color and paleography of the decoration of the burial chamber of Iry-Nefer (Figures 6.21 and 6.22), and photographs during Bruyère's excavation of this burial chamber clearly demonstrating the presence of many commingled human remains (Figure 6.23). Bruyère's original description of the remains from Iry-Nefer — depicting them as heavily commingled and pillaged, with looting activity focused on the crania and thoraxes (1925, 25)—matches their current state. Consequently, though the remains were found in the tomb of Nakhtmin (TT291), they clearly originate from the burial chamber of Iry-Nefer (TT290).

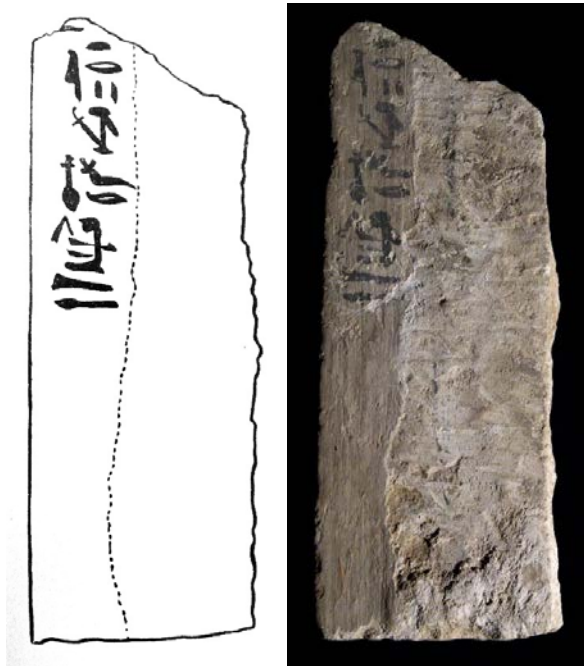


Figure 6.18 Stone ostracon with *jrj-nfr* (Bruyère and Kuentz 1926, plate 15), left
Figure 6.19 Ostracon found in TT291, right



Figure 6.20 Decorated burial chamber of Iry-Nefer (TT290), left
 Figure 6.21 Wall fragment found among the remains, right



Figure 6.22 Photo of Bruyère sitting on top of human remains in the burial chamber of Iry-Nefer (TT290)

The decoration of the tomb walls of Iry-Nefer date to the 19th dynasty and among the contents of the tomb was the burial equipment of Iry-Nefer's father, Wennekhu, who was a workman during the first half of Ramesses II's reign (Davies 1999, 218). Analysis of artifacts and mummification styles documented during the 2012-14 field seasons suggests the tomb was continuously used until the 21st dynasty, a period consistent with the eventual abandonment of the site by the beginning of the Third Intermediate Period. Fragments of cosmetic boxes (Figures 6.24 through 6.25) and canopic chests (Figures 6.26 and 6.27) are parallel to those found in the 19th

dynasty tomb of Sennedjem. A hieratic jar label from the assemblage dates to year 32 (Figure 6.28), belonging most likely to the reign of Ramesses II, but potentially as well to Ramesses III.¹⁷² At the other end of the spectrum, an Osiris shroud painted with red ink belonging to an *jmn-ḥm-wjA* (Figure 6.29) found among the remains is more characteristic of 21st dynasty funerary equipment (Abdalla 1988; Winlock 1926).

The mummification styles also appear to evolve in the tomb. Most mummies demonstrate stereotypical mummification of the New Kingdom, including painted eye brows and desiccation of the body with no subcutaneous packing (Figures 6.30 and 6.31 respectively). However, some display characteristics specific to the early Third Intermediate Period. This includes the presence of a vertical evisceration cut and extreme packing of the chest with a *mélange* of materials including mud and sawdust (Figure 6.32). Consequently, data from artifacts and mummification style suggest a terminal use date by the end of the 20th dynasty or beginning of the 21st dynasty. These dates align with the abandonment of the village by the end of the 20th dynasty and abandonment of the cemetery soon after.

¹⁷² Ramesses III's death early in year 32 of his reign was recorded in the Turin Legal Papyrus. Other than Ramesses II and III, no other ruler reached a reign of 32 years in the New Kingdom.



Figure 6.23 Cosmetic box fragments found in TT291 (left)

Figure 6.24 Analogous cosmetic boxes from the tomb of Sennedjem (right), images copyright of the Metropolitan Museum of Art (www.metmuseum.org)



Figure 6.25 Canopic fragments found in TT291

Figure 6.26 Analogous canopic boxes found in the tomb of Sennedjem, image copyright of the Metropolitan Museum of Art (www.metmuseum.org)

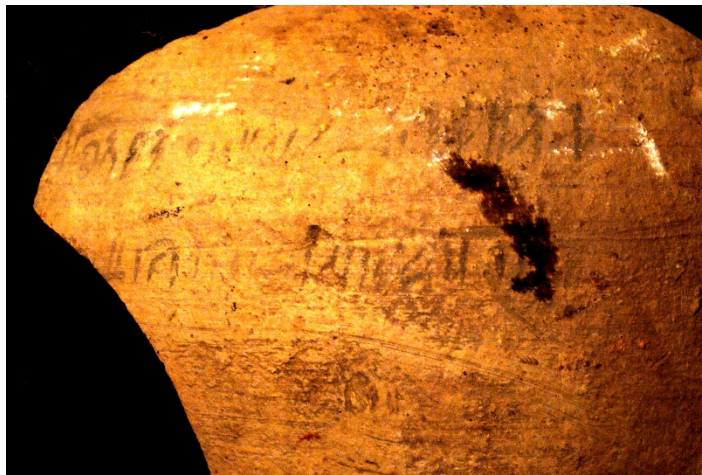


Figure 6.27 Hieratic jar label dating to year 32 found in TT291
Figure 6.28 Osiris shroud belonging to *jmn-ḥm-wj*



Figure 6.29 Painted brows in TT291



Figure 6.30 Mummification without subcutaneous packing in TT291

Figure 6.31 Extreme packing in the chest with mud and other materials as well as a vertical evisceration incision in TT291

This tomb contains a minimum number of 62 individuals. As this assemblage contains no evidence of use after the 21st dynasty, I record all data entries as belonging to either the New Kingdom or Third Intermediate Period. When possible, I also distinguish between these two periods, though for many elements this is impossible.

The remains in this tomb are most likely the product of a continuously used family burial of the Ramesside period and thus the most representative of the community at Deir el-Medina.

7 HEALTH STATUS AT DEIR EL-MEDINA

In this chapter, I present the results of the data collected on the human remains at Deir el-Medina. First, I present quantitative data on overall health status through non-specific indicators as outlined in chapter six. I compare these health indicators between men and women at Deir e-Medina, and demonstrate that overall health for women was better than for men, even beginning in childhood. This difference may be specifically due to the kind of occupational stress placed on men when working in the Valley of the Kings, already evidenced in chapter five.¹⁷³

I then present qualitative cases of injuries and pathologies identified among the human remains. These data are specific examples of physical and activity limitations at Deir el-Medina. They evidence cases of both illness and survival, and they are concrete examples of how individuals with severe health limitations would have still been incorporated into the community.

7.1 MINIMUM NUMBER OF ELEMENTS

Over 1,000 data entries were collected for this dissertation representing both individual elements and complete individuals. Analyses of health status specifically focus on crania, dentition, os coxae, and the long bones. Table 7.1 shows the total number of data entries for each of these data sets and subtotals for the number of male, female, adult, and juvenile data entries. These values delimit which of these data sets are robust enough for comparison of sex and age. They also illustrate the

¹⁷³ This quantitative data set also creates benchmarks for health status at Deir el-Medina, and allows for comparison between Deir el-Medina and other sites in Egypt as well as with data from the Global History of Health Project. These comparisons will be made in chapter eight.

complexity of establishing the minimum number of individuals of the entire assemblage for comparison with other sites. Consequently, I list the MNI per element, as this is more valuable when assessing and comparing individual aspects of health status with other groups.

Table 7.1 Total Data Entries by Element

Data Entry	MNI	Total	Male	Female	Unknown Sex	Adult	Juvenile	Unknown Age
Crania	63	63	21	25	9	53	8	2
Teeth*	39	462	183	189	24	382	66	14
Scapulae	20	33	n/a	n/a	n/a	27	3	3
Humeri	49	94	37	36	6	79	9	6
Radii	23	41	n/a	n/a	n/a	34	3	4
Ulnae	22	41	n/a	n/a	n/a	30	4	7
Os Coxae	38	68	25	17	3	45	10	13
Femorae	84	167	62	62	10	134	23	10
Tibiae	64	124	39	43	18	100	15	9
Calcanei	21	39	n/a	n/a	n/a	31	4	4

*Teeth refers to the number of observable teeth. Age and sex data for these are based on the age status of the individual, and thus can include both permanent and deciduous teeth in the juvenile category.

7.2 SEX DISTRIBUTIONS

Sex estimations at Deir el-Medina are complicated by the relative lack of complete individuals, thus making it difficult to verify age and sex estimates between different elements. To extend the number of sexable elements beyond simply crania and os coxae, I used sample-specific metric sex determination for long bones. This method, however, requires that the sample has a relatively equal sex ratio (less than 1:1.5) and more than 40 elements (Albanese et al. 2005). To test the sex ratio, I evaluated the total number of os coxae and crania, which can be sexed from non-metric morphological characteristics (these values are listed in Table 7.1 above). In

both cases, the sex ratios are very close (less than 1:1.2), and suggest an even distribution of male and female individuals buried at Deir el-Medina.

The next logical question is whether there is enough sexual dimorphism within this sample to delineate between male and female elements. Each element was sexed using two separate univariate metrics with sample-specific sectioning points.¹⁷⁴ When the combined metrics corroborated each other, the individuals were sexed accordingly. When they disagreed (i.e., one sexed male, and one sexed female), the individual was marked as ambiguous.

The results of metric sexing are displayed in scatter plots with confidence ellipses for the distribution of these sex assignments in the femur (Figure 7.1), tibia (Figure 7.2), and humerus (Figure 7.3). In general, there is little or no overlap between the confidence ellipses of elements marked as male and female based on univariate sex metrics, with ambiguous individuals falling somewhere in between these two data sets. When data from complete individuals are known,¹⁷⁵ they also fall within the boundaries of these ellipses. Based on these distributions, the overall sex ratio, and the MNE, the data meet the requirements set by Albanese (2005) for metric sex determination, and can presumably have comparable rates of accuracy as previous reported studies using similar univariate methods.¹⁷⁶

¹⁷⁴ For sectioning points and metrics, see Table 6.3.

¹⁷⁵ For the majority of individuals studied, post-cranial metrics could not be observed due to mummification.

¹⁷⁶ See Table 6.3 for similar studies.

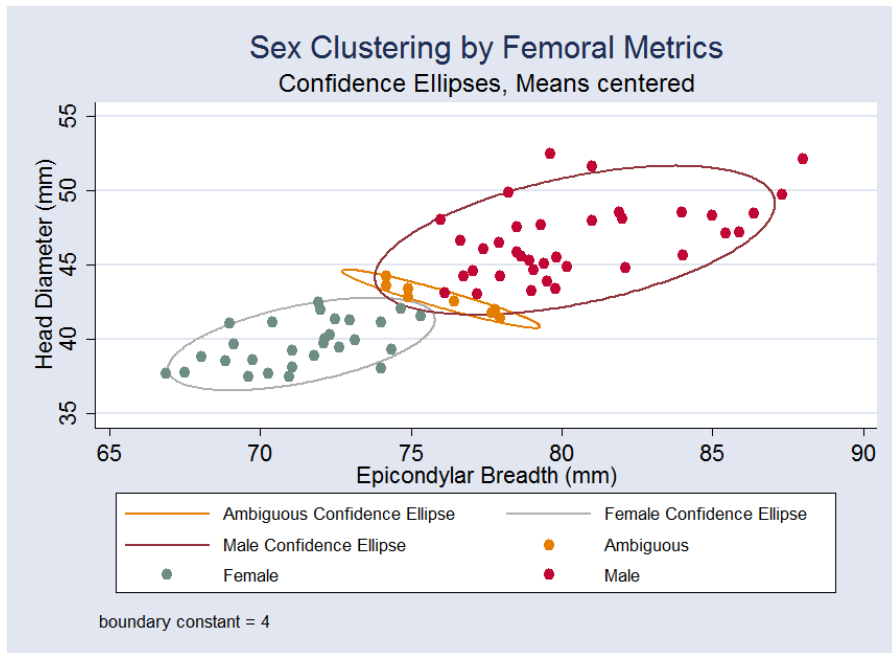


Figure 7.1 Sex Estimation with Femoral Metrics

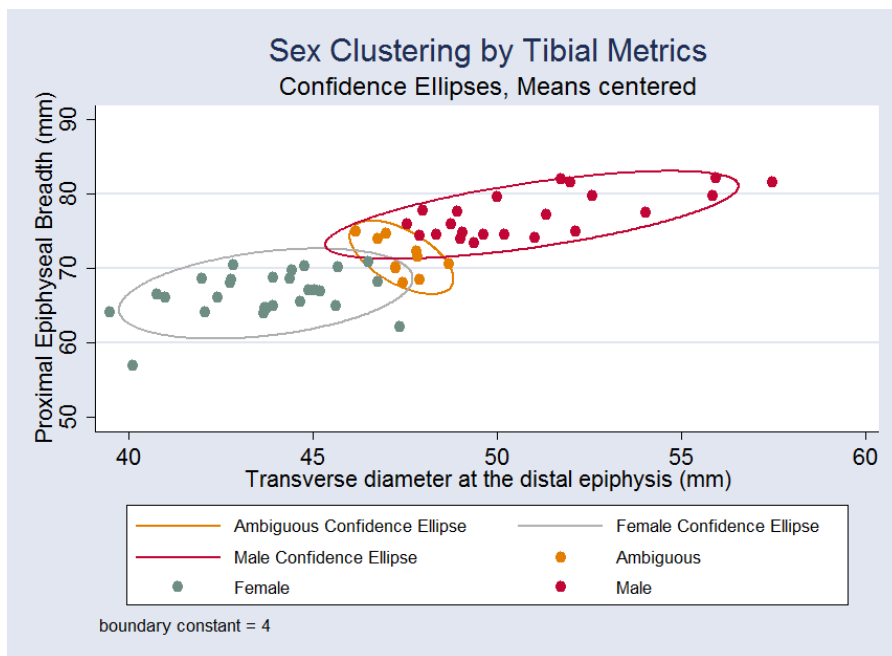


Figure 7.2 Sex Estimation with Tibial Metrics

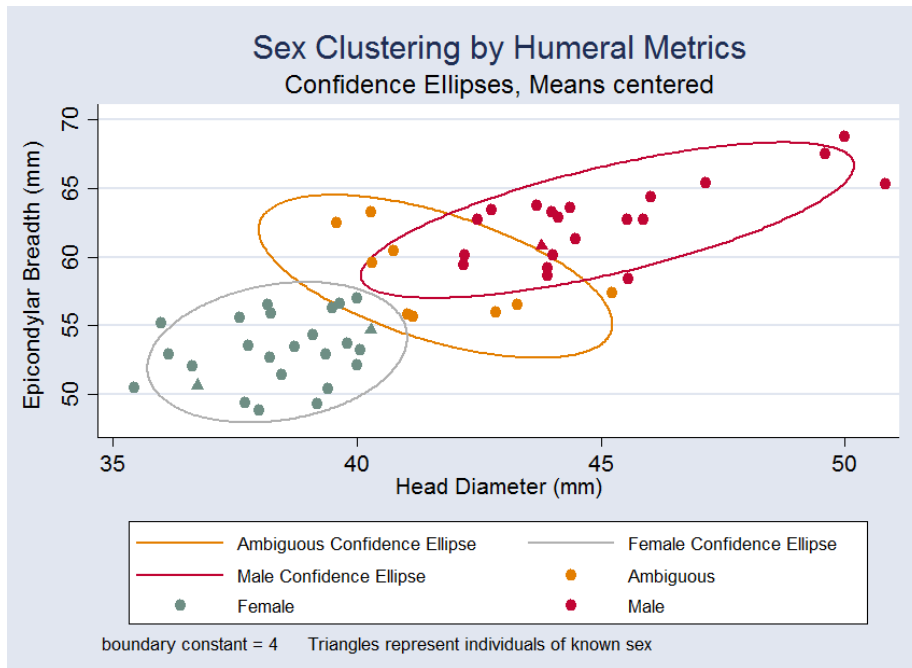


Figure 7.3 Sex Estimation with Humeral Metrics

7.3 AGE DISTRIBUTIONS

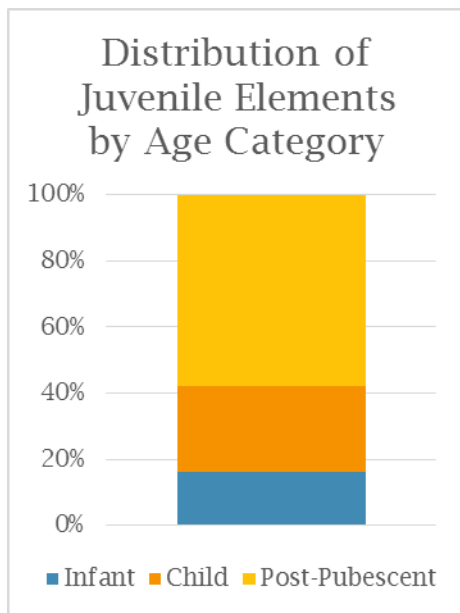


Figure 7.4 Distribution of juvenile elements

Overall, 12.3% of all elements observed were juvenile. Within these, the majority were post-pubescent (older than 12), though the remains of children (4-11) and infants (1-3) were also present (Figure 7.4). For example, the lower arm of an infant was found partially wrapped in TT 290 (14355; Figure 7.5). As children were buried in a different area of the village than adults in the 18th dynasty (Janot 2003), this clearly demonstrates that during the Ramesside period family burials could include individuals from any age group, and these individuals could be buried with the same ritual wrapping as seen in adults.



Figure 7.5 Wrapped lower arm of an infant from TT 290/291 (14355)

Among adults, there is a progressive decline in age-at-death, with more young adults (20-35) than middle adults (35-50), and more middle adults than old adults (50+, Figure 7.6). This pattern is similarly distributed between males and females. The osteological data suggest that while 13% of individuals could reach an age of 50 or older, nearly half (47%) of individuals died under the age of 35. This evidence supplements and corroborates information from the texts, which document the

infrequent presence of individuals of very advanced age at Deir el-Medina, with at least 33 people documented in their sixties or older (McDowell 1998).¹⁷⁷

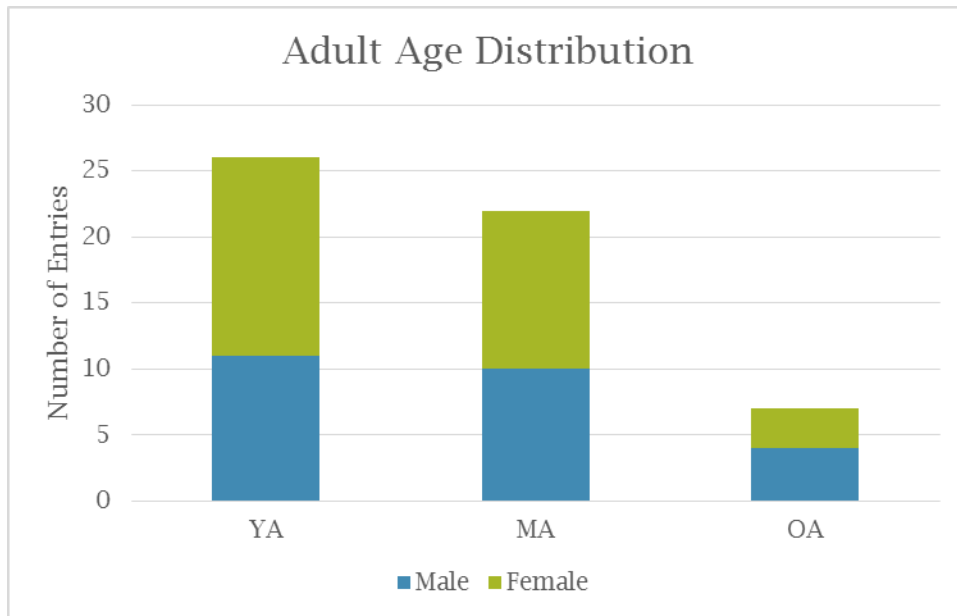


Figure 7.6 Adult age distribution

7.4 ADULT STATURE ESTIMATES

Achieved stature reflects the amount of stress experienced during childhood and adolescence, whereby increased stress results in decreased adult stature (Goodman and Martin 2002, 19–20). Box plots of male and female adult stature estimates at Deir el-Medina (Figure 7.7) show the range in adult stature. On average, male stature at Deir el-Medina is 167.2 cm and female stature is 154.0 cm, resulting in 7.8% sexual dimorphism. This difference in means is statistically significant in a one-tailed *t*-test (Table B.1; $t[103]=-12.69$, $p<0.0001$).

These data are comparable to stature estimates from other sites in Egypt (see chapter eight). The level of sexual dimorphism is slightly higher than reported data

¹⁷⁷ It is difficult to determine what percentage of the population these individuals represent, since the textual record only documents a portion of the population at Deir el-Medina.

from other sites (Zakrzewski 2003), which range from 4.9% to 6.8%. Consequently, this difference in sexual dimorphism at Deir el-Medina could reflect the combination of natural dimorphism and a real difference in health status between men and women. Whether this disparity reflects insufficient growth among males at other sites, or insufficient growth of females at Deir el-Medina will be discussed in chapter eight.

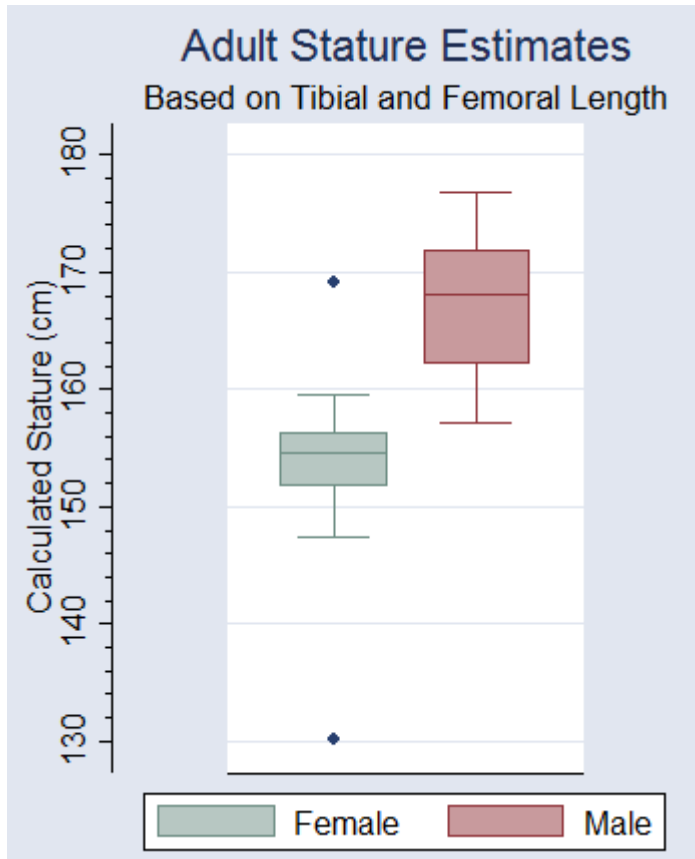


Figure 7.7 Box plots of adult stature estimates

7.5 TIBIAL PERIOSTOSIS

Evidence for infection of the tibia was present in 19% (19/99) of adult tibiae observed at Deir el-Medina. There was a significant difference among these in the presence of tibial periostosis between male and female tibiae, with 33% (13/40) of male in comparison to 12% (5/43) of female tibiae exhibiting some form of periostosis

(Table B.2; $p=0.032$, Fisher's exact test). Additionally, only male tibiae scored for more extensive presence of periostosis (scores of four or higher).

One pair of articulated left and right tibiae exemplify this more extensive periostosis (13357-13360; Figure 7.8). There is bilateral cortical thickening, with periostosis present throughout the entire length of the shafts in conjunction with cloacae on the anterior shafts. The articulated fibulae also have extensive periostosis throughout the shafts. The bilateral presence of infection throughout all four elements indicates that there was a hematogenous spread in the infection, rather than a spread from a direct injury or contiguous source (Resnick 1996, 650). Based on the amount of woven bone present, this infection was active at time-of-death. It is interesting to note that there is also an osteal reaction that spreads around the plantarflexion muscles of the malleolar groove (Figure 7.9). This distribution shows that the extensive osteomyelitis did not inhibit this individual from using these muscles up until his death.

This particular example links tangible evidence for infectious disease at Deir el-Medina with evidence from the absence from work texts (discussed in chapter five). Like *Mr-Shm.t*, this man would have suffered from chronic infection, likely having the infection for more than one month based on the presence of sequestra on the tibiae (Weissman 2009, Table 19-1). Yet, he could have been actively walking during this period, and the forced movement to and from the Valley of the Kings could have severely hampered his ability to recover.



Figure 7.8 Osteomyelitis in paired tibiae and fibulae (13357-13360)



Figure 7.9 Periostitic growth around the muscles of the malleolar groove

7.6 NON-SPECIFIC MARKERS

Given the small sample sizes for linear enamel hypoplasias, cribra orbitalia, and porotic hyperostosis, I analyzed their combined presence to determine overall frequency and differences between male and female subsamples. Among all adults and children, 28% of skulls (17/60) have one or a combination of linear enamel hypoplasias, porotic hyperostosis, or cribra orbitalia. When the absence or presence of these markers are compared between males and females,¹⁷⁸ they are more frequently present among males (26%) than females (11%), suggesting increased juvenile stress for males than females at Deir el-Medina (Table B.3; $p=0.05$, Fisher's Exact Test).¹⁷⁹

¹⁷⁸ These values are combined, and so represent more than the total number of skulls.

¹⁷⁹ Calculated as the sum of scores for linear enamel hypoplasia, cribra orbitalia, and porotic hyperostosis.

This conclusion is complicated by the fact that males tend to be more sensitive to environmental variation than females (Greulich 1951), though these differences can also be encouraged by cultural factors and consequently difficult to measure (Stinson 1985). Comparisons with broader populations documented in the Western Hemisphere Project (chapter eight) allow me to determine whether these differences represent true variation in stress, or natural differences in male and female responses to stress.

7.6.1 Linear Enamel Hypoplasias (LEH)

The sample size for observing linear enamel hypoplasias (LEH) was relatively small at Deir el-Medina (n=18), as dentition must have at least one incisor or canine present with non-severe occlusal surface wear in order to observe the enamel. Only three of the observable and sexed dentition were identified with LEH: 13392, 13204, 13363. Among these, all were male. Both 13204 and 13363 exhibited cribra orbitalia as well, though neither cribra orbitalia nor porotic hyperostosis were present on 13392.

7.6.2 Cribra Orbitalia

Overall at Deir el-Medina, 29% (16/56) of observable frontal bones had cribra orbitalia. Within this sample, 31% (5/16) of males and 17% (4/23) of females had cribra orbitalia. Among juveniles, 50% (4/8) exhibited cribra orbitalia. The majority of cases for cribra orbitalia show a moderate reaction; of the 16 frontal bones with cribra orbitalia, 12 had moderate lesions (a cluster of fine foramina covering less than 1 cm²), while only four had more extensive lesions.

7.6.3 Porotic Hyperostosis

Of the observable skulls and parietals, 16% (7/44) had porotic hyperostosis. Among these, 18% of males (2/9) and 9% of females (2/20) had porotic hyperostosis. The rate for juveniles was 29% (2/7).

Of those elements exhibiting porotic hyperostosis, all exhibited more moderate expressions of porotic hyperostosis (Figure 7.10); none had gross lesions with excessive expansion. As with cribra orbitalia, these rates suggest that when an individual experienced an episode of stress, they did not experience extreme enough or long enough deprivation to develop an advanced lesion.



Figure 7.10 Moderate porotic hyperostosis at Deir el-Medina

7.7 DEGENERATIVE JOINT DISEASE

7.7.1 Osteoarthritis

Osteoarthritis in adults was scored for each of the six major joint regions: shoulder, elbow, wrist, hip, knee, and ankle. While all elements associated with these regions were scored, sex could only be assigned for the humeri, os coxae, femora, and tibiae, as sexual dimorphism is less prominent in the other long bones and these

elements also had insufficient sample sizes for metric sexing. Similarly, while population-specific sexing criteria exist for scapulae (Dabbs 2010), only seven out of 27 recorded scapulae were complete, making sex estimates relatively rare for this element. While this is disadvantageous, in reality, the only joint region that cannot be compared by sex is the wrist, which typically shows the least amount of degenerative joint disease¹⁸⁰ and which may consequently be less informative of differences in DJD between sexes.

The overall distribution of average joint scores decrease from the shoulder to the wrist, and then rise again for the hip, drop down at the knee, and peak in the ankle (Figure 7.11). The lower limb has higher average scores of DJD than the upper limb, which is to be expected due to increased stress from bearing weight. The presence of higher DJD in the ankle is atypical, however, and suggests increased pressure on this joint in daily life activity for all adults at Deir el-Medina. This may be due to Deir el-Medina's relatively remote location in a topographically diverse area. Constant climbing in the Theban hills in conjunction with a rocky landscape would place undue stress on the ankle, and could lead to more sprains and injuries than at most sites.

¹⁸⁰ See chapter eight for information on general patterns of degenerative joint disease in the Western Hemisphere Project.

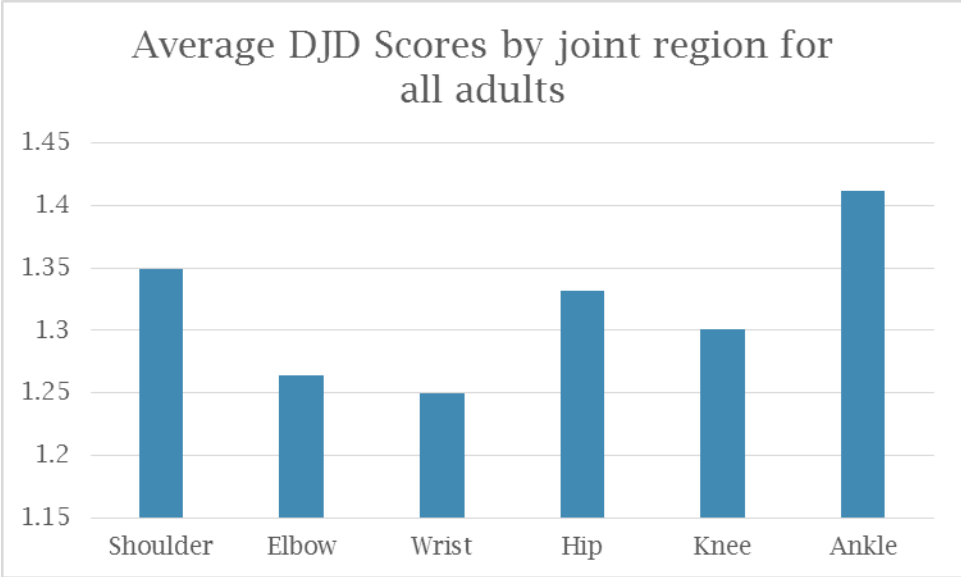


Figure 7.11 Distribution of average scores for degenerative joint disease by joint region

Male elements have a higher percentage of DJD in all joint regions (Figure 7.12), though this difference is only statistically significant in the elbow, knee, and ankle (see Tables B.4 through B.8). While some of this difference is likely due to normal variation in DJD because males are generally larger and thus experience more stress on weight-bearing joints, the fact that these differences exist in the elbow and that disparities in the knee and ankle are much greater than the hip requires further explanation.

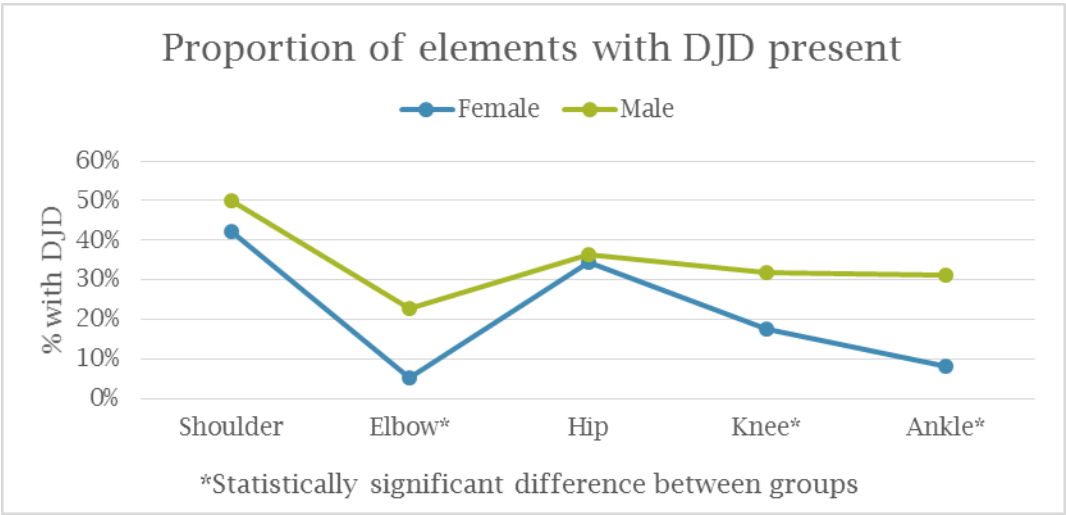


Figure 7.12 Distribution of DJD by joint region and sex

The daily stress of the workmen may explain these discrepancies. Movement from Deir el-Medina to the workmen's huts as well as from the huts to and from the Valley of the Kings would have taken its toll on the workforce; the constant climbing up and down would have added increased stress on the knee and ankle specifically. Even though only part of the population at Deir el-Medina were the workmen themselves, many of the male members of the Deir el-Medina community who were not official workmen, such as youth of the Necropolis who often apprenticed as workmen and who were expected to run back and forth between the village and the Valley of the Kings, would have experienced similar stress. Similarly, the work of preparing and decorating the rock-cut tomb through stone-cutting and fine chiseling would have placed more stress at the elbow, and squatting to decorate lower areas of the tomb would have further affected the knees and ankles of these workmen.

It was very rare to find joints with more excessive degenerative joint disease, such as eburnation. In fact, eburnation was observed in only two femora, both of which were adult females. Both had extensive eburnation on the distal end (Figure 7.13), despite relatively little arthritis evidenced in the femoral heads. Consequently, the stress must have been from an activity focused on the knee much more than the hip, such as kneeling for grinding bread. While women experienced less overall degenerative joint disease, these examples show that in rare cases, women also experienced the most extreme degenerative joint disease in the assemblage.



Figure 7.13 Eburnation on the medial condyle of 14214

7.7.2 Osteophytosis

I assessed osteophytosis for each of 127 data entries with one or more vertebrae present.¹⁸¹ The average score for osteophytosis was 1.43 (on a scale of 1-3). There was a consistent decrease in the number of vertebrae scoring for osteophytosis, with a similar trend in scores for osteoarthritis in the vertebral facets. When this is compared by vertebral region, there is a higher proportion of lumbar vertebrae scoring for extensive osteophyte formation than thoracic or cervical vertebrae (Figure 7.14). These distributions are normal given the increased weight-bearing of lumbar vertebrae. Additionally, Schmorl's nodes were present in several cases, though they were not systematically recorded and consequently cannot be aggregated.

¹⁸¹ Articulated vertebrae were recorded in the same data entry.

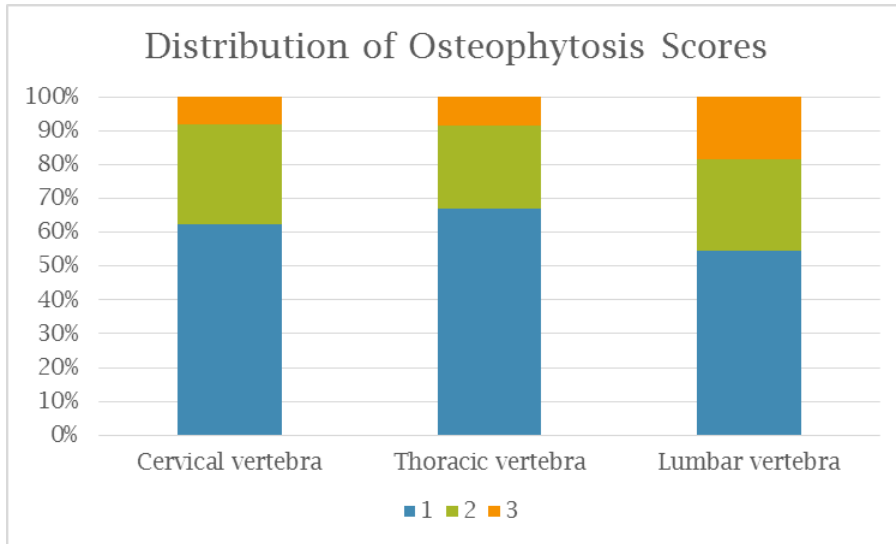


Figure 7.14 Osteophytosis scores by vertebral segment

Since the majority of vertebrae come from commingled contexts, it is difficult to determine whether the amount of osteophytosis present is from labor or aging. When the graph of osteophytosis scores for lumbar vertebrae overlays adult age estimates (Figure 7.15), we can see a similar distribution in the severity of osteophytosis scores and increases in age. This suggests that the rate of increasing severity in osteophytosis scores accrues at a similar pace to aging at Deir el-Medina.

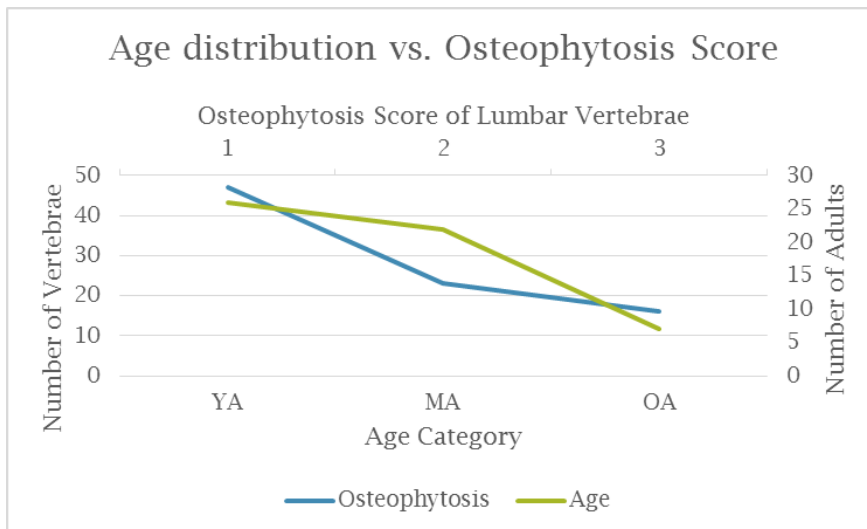


Figure 7.15 Overall age distribution of crania and os coxae (bottom and right axes) compared to the distribution of the scores for the severity in osteophytosis (top and left axes)

7.8 DENTAL HEALTH

I was able to observe 63 different sets of dentition at Deir el-Medina. 52 of them were adult, with nine sets of juvenile dentition. Of the adult dentition, 25 could be identified as female, 17 as male, with the remainder as indeterminate.

Overall, dental health was similar between males and females at Deir el-Medina. These similarities suggest that men and women not only had similar diets, but also would have faced some of the same dental health problems as they aged. Thus, among elderly residents of the village, both men and women would have faced similar problems in terms of advanced tooth wear, cavities, and abscesses.

7.8.1 Tooth Wear

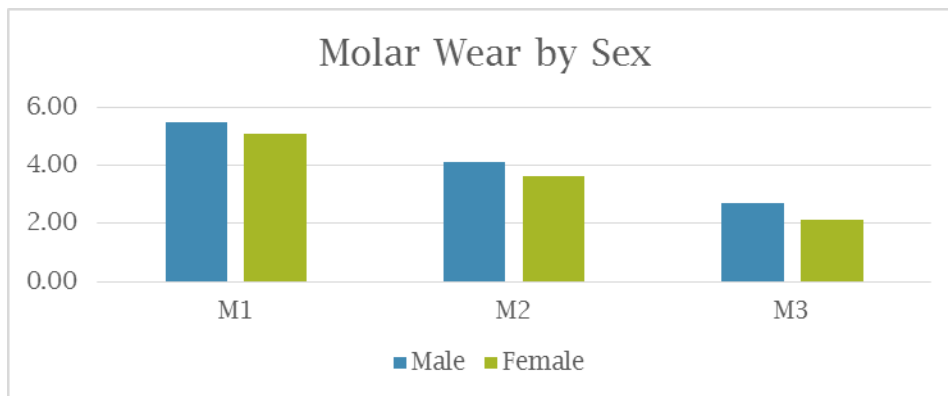


Figure 7.16 Molar occlusal surface wear by sex

The amount of wear on the first, second, and third molars does not show any statistically significant difference between male and female skulls, even though male averages for all three wear scores tend to be slightly higher (Figure 7.16). Wear scores naturally decrease based on their eruption, with more wear found on the first molar because it is the first to erupt. Though limited, juvenile dentition also shows that wear was present in deciduous teeth, and juveniles could have full dentine exposure prior to losing their deciduous teeth.

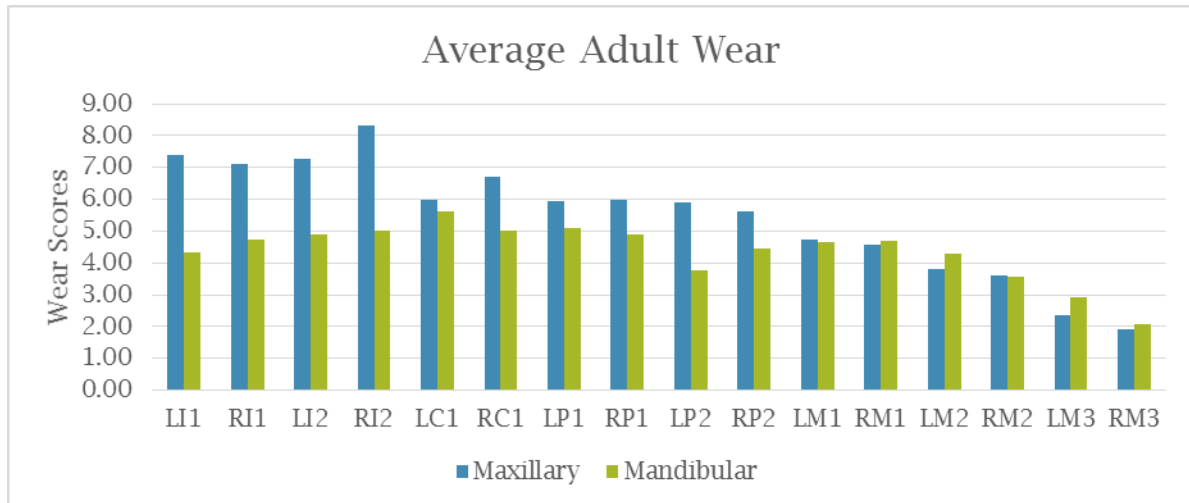


Figure 7.17 Average adult occlusal surface wear

In general, wear scores decrease moving towards the back of the mouth, and the maxillary dentition shows more wear for the incisors, canines, and premolars, while the molars have slightly more wear in the mandible. This pattern is exemplified in individual 13011 (Figure 7.18), an old, adult female from TT217. The wear in this individual has progressed so far that the crowns of the maxillary incisors have been completely removed, exposing the roots. The crown heights then show progressively less wear moving posteriorly towards the molars. The angle of the wear decreases the crown height towards the buccal side bilaterally.¹⁸² Wear that is this excessive could have limited her ability to bite and chew and thus limited her diet. It also would have exposed her to higher risks of tooth decay, evidenced by multiple cavities and the presence of a buccal abscess above her left maxillary second molar.

¹⁸² This trend was noted among agriculturalists when compared to hunter-gatherers (Smith 1984).



Figure 7.18 Dental wear in 13011, an old adult female from TT217

7.8.2 Ante-Mortem Tooth Loss (AMTL)

Among adult dentition at Deir el-Medina, 11% of teeth were lost ante-mortem. These were dominantly mandibular teeth, and it was more common for molars to be absent ante-mortem than the other tooth types. Among molars, 18% on average were lost or removed ante-mortem.

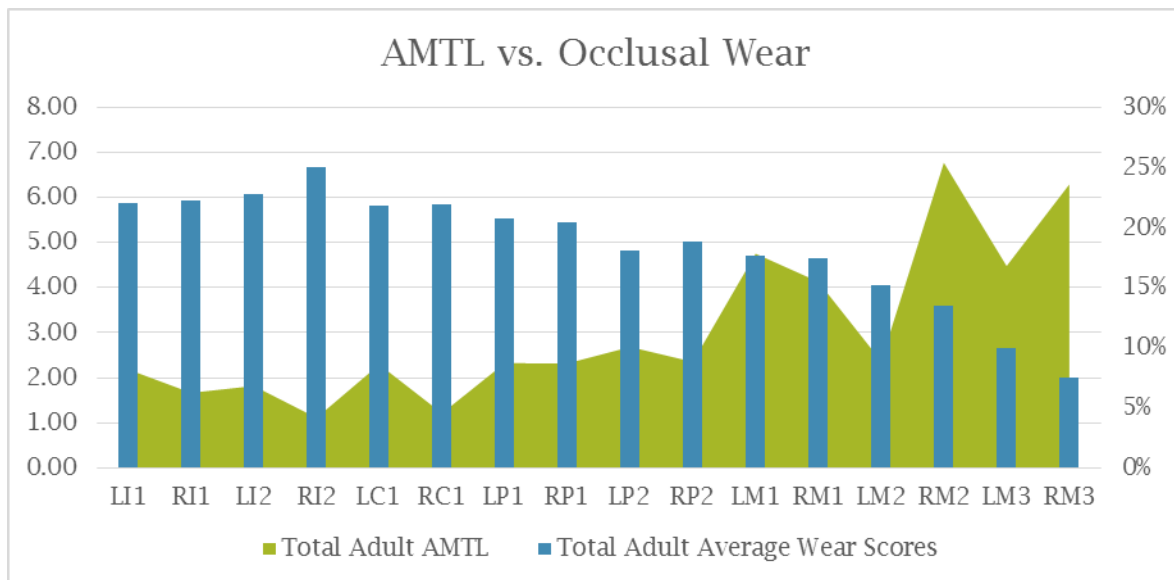


Figure 7.19 Ante-mortem tooth loss compared to occlusal wear based on the location of dentition

This trend is inversely related to dental wear, which is more pronounced at the front of the mouth moving back (Figure 7.19). Instead, it correlates more closely with the rate of cavities, and suggests that carious lesions were the most likely cause for ante-mortem tooth loss, either through related periodontitis or medical intervention (tooth-pulling).

There is still debate about the use of medical intervention in dental care in general in Egypt (Miller 2008) and examples for Deir el-Medina both corroborate and contradict the possibility of medical intervention. In some cases, teeth remain in the mouth although abscesses, cavities, and extensive periodontal disease are present, as seen in 13486 (Figure 7.20). One would anticipate that in such circumstances, one would not only want to remove affected teeth, but also that it would have been easier to remove them due to these combined pathologies. On the other hand, the presence of individual teeth missing when there is relatively little periodontal disease (Figure 7.21) suggests that they were medically extracted rather than lost due to pathology (Miller 2008, 31).



Figure 7.20 Teeth are left in place despite dental disease in 13486



Figure 7.21 Possible extraction in 13002

In this sample, 46% of either adult maxillary or mandibular dentition had at least one tooth lost ante-mortem. Individually, these represent half the dentition, suggesting that the majority of individuals at Deir el-Medina most likely experienced tooth loss. In fact, the average number of teeth lost ante-mortem per dentition (for combined maxillary and mandibular) was 4.62, a number similar to the 4.26 reported by Miller (2008, 72) on her analysis of New Kingdom dentition. This value for Deir el-Medina includes extreme examples where the full dentition had been lost ante-mortem, such as 13015, an old adult female found in TT217 (Figure 7.22). In this case, the woman would have had to eat without any teeth; she must have had access to a diet that could have sustained her without mastication.



Figure 7.22 Complete ante-mortem tooth loss in 13015, an old adult female from TT 217

There are one or more teeth lost ante-mortem in 59% of females vs. 29% of males. This difference is statistically significant (Table B.9; $\chi^2[1, n=48] = 4.48$, $p=0.034$). Additionally, the disparity between male and female AMTL is even larger when more teeth are lost ante-mortem (Figure 7.23).

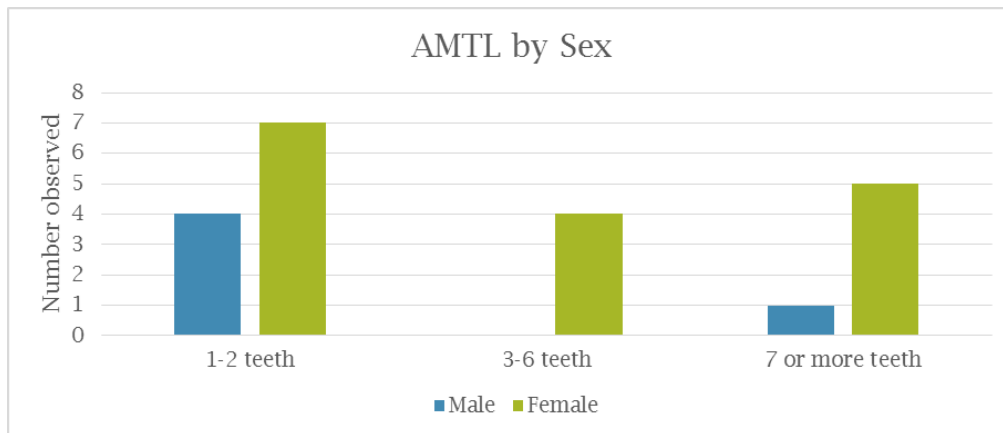


Figure 7.23 Ante-mortem tooth loss by sex

There is also more variation in patterns of wear and AMTL among female dentition at Deir el-Medina. For example, in 12057 the wear pattern is asymmetrical, specifically affecting the right second premolars which have a sharp inferior-posterior to superior-anterior angle (Figure 7.24). The first and second molars have been lost ante-mortem bilaterally, but there is no angle to the wear of the left second premolars, making the wear pattern asymmetrical. It is possible that this asymmetry is due to occupational abrasion. This could have been, for example, developed from wetting fiber for spinning thread through the right teeth, a practice documented art historically in ancient Egypt (Nicholson and Shaw 2000, 272) as well as in modern ethnographic examples (Crowfoot 1931, 20, 33-35). Scribal chewing of reed brushes can cause asymmetrical wear patterns in the molars (Molleson 2007, 10), though this has not yet been documented among the human remains at Deir el-Medina.



Figure 7.24 Asymmetrical wear in 12057, an old adult female from TT217

7.8.3 Abscesses

The rate of abscesses among adults at Deir el-Medina is 23%. These are dominantly on the buccal side of the maxillary dentition, as seen in 13486, an old adult male (Figure 7.25). In this example, the abscess has clearly developed a large cavity around the root. The thin periosteum was likely broken post-mortem, though it is likely that some of it had already eroded in order to create a drainage canal from the tooth root to the surface. There is also extensive periodontitis throughout the maxillary alveolar surfaces, as well as a deposition of compact bone around the edges of the abscess itself, showing active healing at time of death.



Figure 7.25 Buccal abscess in 13486, an old adult male from TT291

The proportion of individuals with abscesses at Deir el-Medina is insignificantly different between male and female skulls (Table B.10; $p=0.43$, Fisher's exact test). The average number of abscesses per recorded dentition is 0.33.

7.8.4 Calculus

The rate of calculus per data entry at Deir el-Medina for adults overall is 38%. The rate of calculus for males is 50% and for females is 30%, but this difference is too small to be significant (Table B.11; $p=0.52$, Fisher's Exact Test). In general, when calculus is present, it is only a thin line, with relatively low levels of calculus build-up overall. In some cases, however, asymmetrical distributions of calculus are present, and may suggest unusual chewing patterns or activity-related chewing. For example, in 13363, there are extensive deposits of plaque on the left dentition, specifically the molars, and nearly none on the right side (Figure 7.26).



Figure 7.26 Asymmetrical calculus distribution in 13363, the mandible of a middle adult male from TT291. Deposits are greater on the left mandibular molars (bottom) than the right (top).

7.8.5 Carious lesions

The rate of cavities per data entry at Deir el-Medina for adults overall is 27%. The rate of cavities for males is 28% and for females is 26%, but this difference is too small to be significant (Table B.12; $p=0.45$, Fisher's Exact Test). The mean number of carious lesions per element is 0.46, which is higher than the 0.35 reported by Miller for the New Kingdom, though similar based on the standard deviation Miller reports (0.71, 2008, 77). Cavities tend to be distributed on the molars, where lesions develop more readily as the occlusal surfaces tend to retain food remnants and bacteria more than the incisors, canines, and premolars.

7.9 OVERALL MALE VS. FEMALE HEALTH

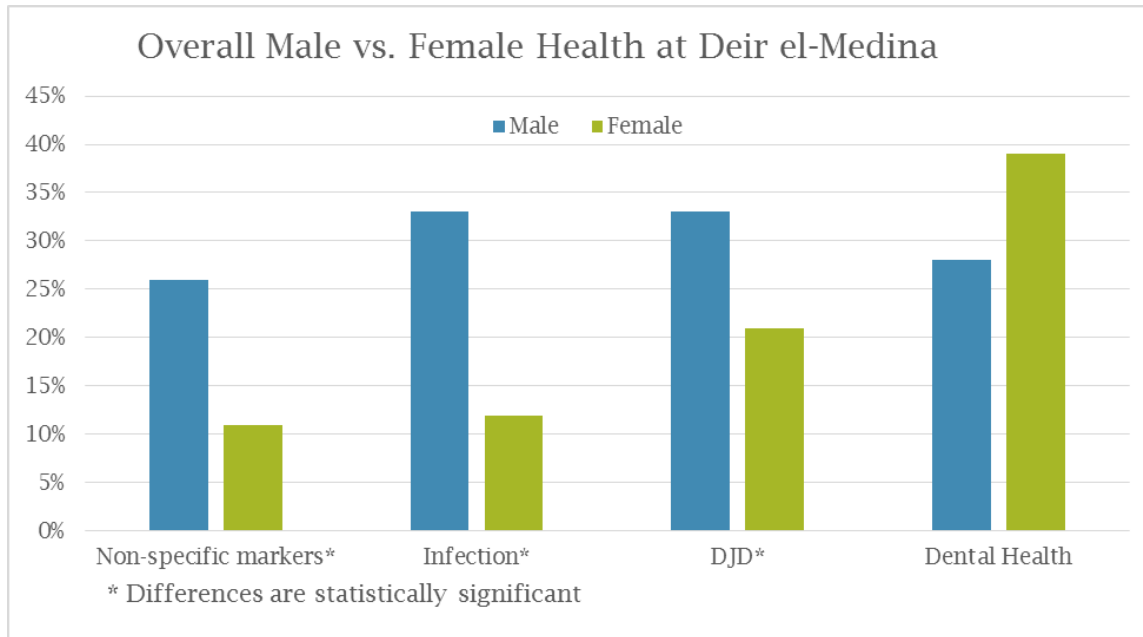


Figure 7.27 Overall male vs. female health at Deir el-Medina

When viewed in aggregate (Figure 7.27), these indicators of overall health at Deir el-Medina suggest that in both adolescence and adulthood, males experienced more overall stress. Non-specific markers of stress during development—cribra orbitalia, linear enamel hypoplasias, and porotic hyperostosis—are significantly higher for males than females (Table B13; $p=0.05$, one-sided Fisher’s Exact Test). Similarly, rates of infection in adult tibiae and degenerative joint disease—both signs of adult health—are also significantly higher for males than females. Poor dental health, on the other hand, is higher for females than males, though this difference is insignificant and is mostly due to differences in the amount of ante-mortem tooth loss. Other indicators of dental health are insignificantly different between males and females.

These differences in overall health suggest that men, even from childhood, experienced more overall health-related stress than women. Based on the absence from work texts, these stresses were likely due to the expectations for daily work at the

Valley of the Kings, and hikes between the Valley of the Kings and the workmen's huts would have had their toll on the workmen's joints. The landscape could have also added stress when they were suffering from an illness; in cases such as *Mr-Shm.t*, it is apparent that sick workmen either had to hike home, which required them to hike a further distance in periods of elevated stress, or stayed in the workmen's huts where they would have had less access to caretakers.

7.10 TRAUMA AND PALEOPATHOLOGY

The previous section addressed health status through several measurements of general stress on the body. These measurements, when aggregated, give us a picture of the normal range in health status at the site, and make it possible to compare broader trends within the Deir el-Medina population.

In this section, I refocus analysis from this normal range in the osteological data set at Deir el-Medina, to its outliers. These outliers are specific examples of abnormal bone formation, representing some of the categories of pathology not yet discussed (i.e., congenital disorders, trauma, and neoplastic conditions). This section thus complements the quantitative data about health status at Deir el-Medina by illustrating it with qualitative data that can identify the kinds of diseases and ailments present at Deir el-Medina, as well as the degree of healing at the site.

For each example, I indicate the ID number of the element, skull, or individual and offer a full description of the pathology prior to offering a disease classification and differential diagnosis. I also combine information from the disease description and classification to describe the potential overall health impact. This latter assessment is based on relevant clinical scholarship that describes potential impairments and activity limitations from a disease. As the objective here is to provide

clear paleopathological examples of physical limitations that could alter an individual's health, I exclude paleopathological examples found at Deir el-Medina with ambiguous or insignificant health impacts, such as congenital anomalies like parietal thinning.

7.11 TRAUMA

Relatively few incidents of traumatic injuries were noted among the human remains at Deir el-Medina. I identified three compression fractures out of 127 data entries on vertebrae.¹⁸³ I also noted only one fracture in the arm, one possible fracture in the leg, and one depressed fracture on the frontal. Given this small data set, it is impossible to compare rates of fractures by sex, yet assessing these individually can help us understand the impact these injuries would have had on the health of these individuals.

7.11.1 A Vertebral Compression Fracture of a Post-Pubescent Female from TT217 (13008)

A compression fracture in 13008 demonstrates how even young adults at Deir el-Medina could experience debilitating injuries that would have limited their participation in daily life activities. 13008 is one of the few data entries representing a complete individual of known context. Based on the morphology of the os coxae, this is a post-pubescent juvenile female.¹⁸⁴ She was buried in shaft 1371, and dates by mummification style and provenance to the 18th dynasty. This individual has Schmorl's nodes on the inferior body of the T12 and both the superior and inferior bodies of the L1. The L1 has a compression fracture which angles the vertebra anteriorly (Figure

¹⁸³ This value does not include Schmorl's nodes.

¹⁸⁴ The iliac crest and ischium are both partially fused, while the sciatic notch is very broad with the presence of a clear pre-auricular sulcus.

7.28), and which has resulted in slight osteophytosis on the superior body. The Schmorl's nodes and anterior angle of the L1 were likely formed simultaneously in a compression of the vertebral column. This event would have occurred long enough before death to allow for the bone to heal and react to form osteophytes.



Figure 7.28 Compression fracture on the L1 of 13008, a juvenile (post-pubescent) female from tomb 1371

Based on the age of this woman, the presence of adjoining Schmorl's nodes, and the compression fracture itself, it is possible this woman would have experienced debilitating back pain after her injury. In some cases in modern clinical studies, compression fractures can go unreported. These asymptomatic fractures, however, are often found in aging populations due to osteoporosis (Carberry et al. 2013), unlike the fracture here which was most likely trauma-induced given the young age of this individual. While it is difficult to determine how long she would have been physically limited by the injury, it is possible that she would have experienced chronic back pain up until time of death. In a modern clinical study, a substantial number of patients

receiving pain relievers for compression fractures still experienced disabling pain more than one year after their injury (Venmans et al. 2012).

This woman would thus have had difficulty participating in some aspects of daily life at Deir el-Medina requiring intense stress on the lower back, such as grinding bread or carrying heavy loads. She would have relied on the assistance of female servants provided by the state and her family for these types of food preparation, a practice already documented in the texts (see discussion of O. Prague 1826 on page 111).

7.11.2 A Depressed Fracture in the Skull of an Adult from TT6 (13313)

Another case of trauma at Deir el-Medina was a depression fracture to the frontal (13313; Figure 7.29). The depression (15 mm in diameter) is shallow, with clear margins and fine pitting. There is irregular presence of compact bone growth on top of the porosity. There is no sign of bony activity on the inner table. Unfortunately, as the frontal was found separate from the rest of the cranium, it is impossible to tell the exact age or sex of this individual, though based on the size and fusion of the metopic suture, this frontal likely belonged to an adult. Out of 63 skulls, this was the only example of a depressed fracture (1.6%). This suggests that while textual evidence for interpersonal conflict shows that it was clearly present at Deir el-Medina,¹⁸⁵ it was not a primary issue in health.

¹⁸⁵ Interpersonal conflict is documented in the absence from work texts (e.g., O. Gardiner 37) and judicial documents (e.g., O. BM EA 65938).



Figure 7.29 Depressed fracture on the frontal of 13313

7.11.3 A Well-Healed Fracture to the Left Ulna of an Adult from TT291 (14124)

I also identified a transverse fracture in the distal third of a left ulna (14124; Figure 7.30). As this fracture came from a commingled context, I cannot ascertain whether or not the associated radius was involved, and thus cannot determine whether or not it is from a defensive wound—a parry fracture—or from an accident (Judd 2008). Regardless, the callus is fully healed, and is well-aligned. In this case, despite sustaining a traumatic injury, the individual was able to heal fully with likely little to no long-term physical limitation.

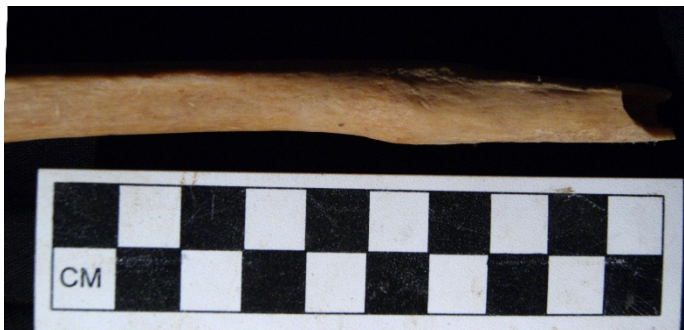


Figure 7.30 Well-healed fracture on the distal third of 14124, a left ulna

7.11.4 A Possible Peri-Mortem Fracture in a Male Adult Femur from TT291 (14058)

Finally, there is a possible peri-mortem fracture to the femur of an adult male (14058; Figure 7.31) that, in contrast to the ulna above, shows little healing and was likely related to the ultimate cause-of-death.¹⁸⁶ The oblique fracture is located in the shaft of the proximal third of the femur. The fracture is beveled and coloration of the fracture matches surrounding bone, suggesting a peri-mortem rather than post-mortem injury (Moraitis and Spiliopoulou 2006). The edges are smooth, suggesting the injury occurred at least one week before death (Moraitis and Spiliopoulou 2006), and potentially longer as there is also extensive periostosis covering the entire shaft which can slow down the healing response time (Merbs 1989). There is also degenerative joint disease, evidenced through lipping and porosity, on both the medial and lateral condyles. There is no evidence of an attempted union with the proximal shaft, though there is increased irregularity in reactive bone formation at the posterior edge of the fracture and signs of rounding along the superior edge of the fracture. The extent of periostosis despite the lack of healing at the fracture site suggests that this individual may have been suffering from an infection before completely fracturing the femur. Soon after this break—which would have clearly demobilized this individual—he would have died. This fracture could have been induced from pressure on the bone after infection.

¹⁸⁶ Based on the epicondylar breadth (86 mm) and fusion at the distal epiphysis.



Figure 7.31 Possible peri-mortem fracture in 14058, an adult male. In clockwise order: Pitting and new bone formation along the shaft (top left). Pitting and new bone formation continued to the distal epiphysis along with lipping at the joint margins (top right). Anterior view of the oblique fracture along the proximal third of the shaft. Arrows show deposits of cortical bone along the edge of the fracture (bottom right). Posterior view of the fracture with striations along the shaft, increasingly irregular reactive bone formation near the fracture, and rounded superior edges (bottom left).

7.12 PATHOLOGICAL ELEMENTS

7.12.1 Two Cases of Coxa Valga from TT291 (13552/14013)

In two cases, 13552 and 14013, I identified femora with coxa valga, an abnormally obtuse angle between the femoral head and the shaft (Waldron 2008, 109). This condition, also observed by Ortner (Ortner [003-009](#)), is typical when “partial to complete paralysis of the limb occurs during the growth phase” (Ortner 2003, 291). It is also associated with a flattening and elongation of the trochanters and a more slender femoral shaft (Ortner 2003, 477).

Both 13552 and 14013 (Figure 7.32) have angles of 145° between the femoral head and the shaft. Both as well have elongated trochanters. This is most notable in the greater trochanter of 13552 where the surface of the greater trochanter surrounding the insertion site for the *gluteus medius* muscle shows microporosity and irregular growth and flattening when compared to a normally developed femur (Figure 7.33). The plane of the greater trochanter also shifts from an angle that would normally be perpendicular to the acetabulum, to one that is nearly vertical. Additionally, 13552 has an anterolateral bend in the shaft.

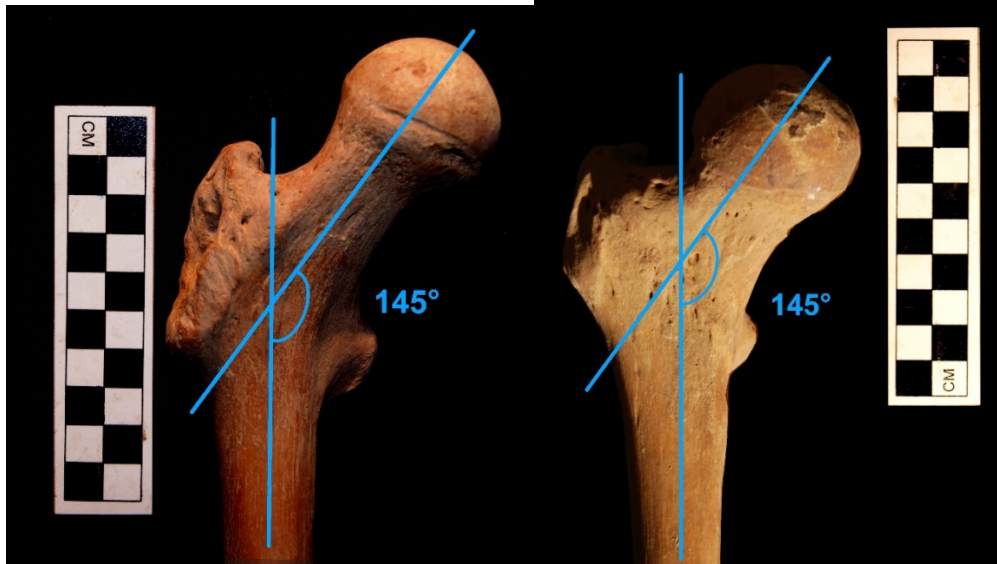


Figure 7.32 Coxa valga in two right femora from TT291. The left (13552) is most likely from a post-pubescent male. The right (14013) is most likely from an adult female.



Figure 7.33 Irregular elongation and flattening on the greater trochanter in 13552, a right femur from a post-pubescent male.

These two femora have relatively little evidence of consistent muscle use in the lower limb. There is no degenerative joint disease in either femur, and the intertrochanteric line (insertion site of the iliofemoral ligament) and linea aspera

(origin site for the vastus muscles and insertion site for the adductors of the hip) are both faint with relatively little rugosity. Based on metric sex determination, 13552 is male and 14013 is female. Also, the partially fused femoral head in 13552 (all other epiphyses are fully fused) suggests this individual was a post-pubescent juvenile (16-19 years old based on fusion rates for males in Scheuer and Black 2004, 356). On the other hand, 14013 is fully fused and an adult.

Coxa valga is classified by Ortner as a neoplastic condition, though the etiology of it is more complex as coxa valga can occur in neuromuscular disorders, infectious diseases, metabolic conditions, or any ailment that results in paralysis of the lower limb (2003, 261). Coxa valga is not only more likely to manifest after paralysis of the leg, but afterwards impairs adduction (Barnes 2012, 168).

One of the most common disorders associated with coxa valga is poliomyelitis. Globally, the earliest evidence for the poliovirus comes from Egypt; the stele of Roma shows a depiction of Roma with a shortened and atrophied leg that has elsewhere been conjectured as poliomyelitis (Wyatt 1993, 947). The 19th dynasty king Siptah had a shortened and atrophied right leg, which was identified as suggestive of poliomyelitis (Harris and Weeks 1973). Neither of these examples, however, have been verified as polio and consequently all evidence so far for this disease is circumstantial.

Regardless of whether the etiology of these cases of coxa valga was poliomyelitis or another disorder, its presence in at least two individuals suggests that both had paralysis in the lower limb as juveniles. With at least one paralyzed leg, these individuals would not have been able to hike outside of the village and farther, the young male would never have been able to participate in work on the tombs—which was the state's purpose for subsidizing the village in the first place. Consequently, the

community at Deir el-Medina would have had to enable these individuals to contribute in other ways to the community.

7.12.2 Scoliosis of an Adult from TT291 (13479)

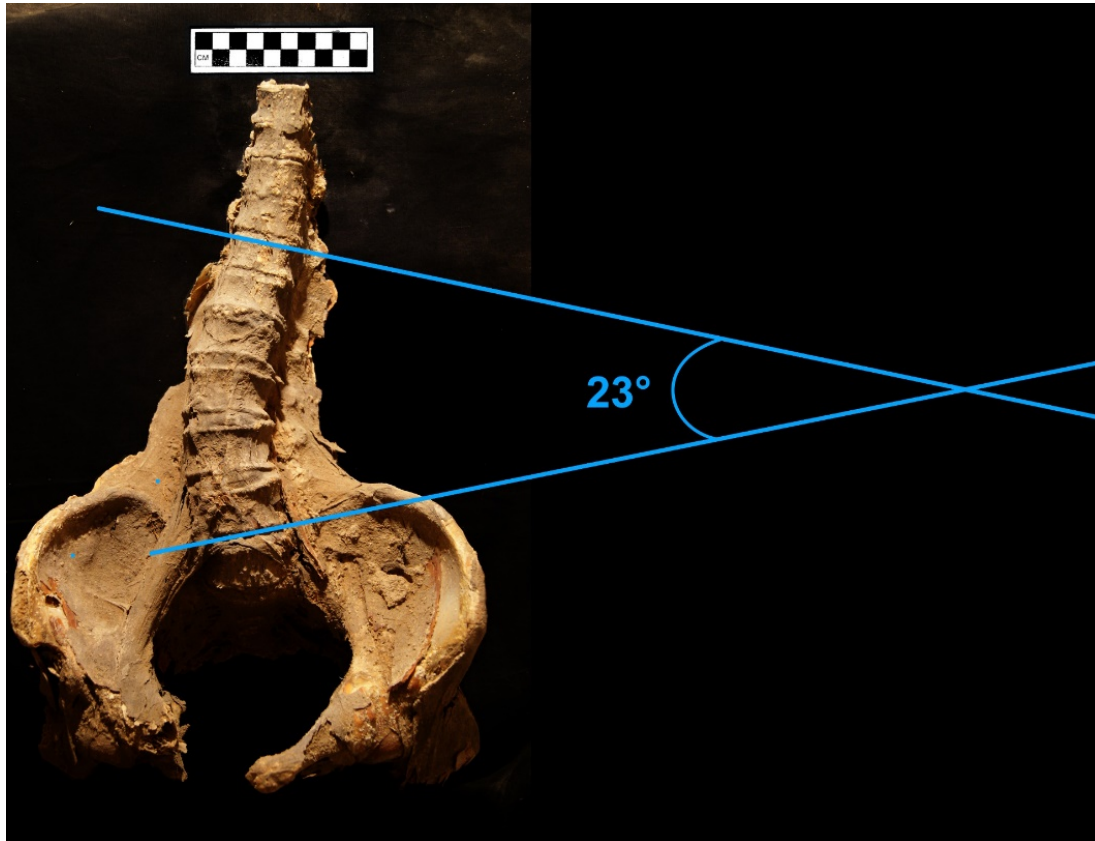


Figure 7.34 Degrees of scoliosis in the articulated spine of an adult from TT291 (13479)

While scoliosis can normally be difficult to identify in commingled skeletal assemblages, chance preservation clearly allows one to see the spinal curvature in the mummified torso of 13479 (Figure 7.34). Using the Cobb method (Cobb 1948), the curvature of this spine is approximately 23°. ¹⁸⁷

¹⁸⁷ There is a great amount of both inter- and intraobserver variability in the Cobb method. To increase the accuracy, I measured the angle digitally using ImageJ, as digitally-assisted measurements using the Cobb method are more accurate (Langensiepen et al. 2013).

Eighty percent of cases of scoliosis are idiopathic (Waldron 2008, 215); though recent clinical research demonstrates that there is a clear genetic factor to most cases of scoliosis, the full etiology is still unknown (Dayer et al. 2013). Otherwise, scoliosis is generally categorized as congenital (Aufderheide et al. 1998, 66) or a secondary consequence to other diseases such as rickets (Aufderheide et al. 1998, 67). The majority of types of scoliosis also form during development.

Recommendations for medical treatment of scoliosis today are based on the degree of spinal curvature. In this case, with a curvature of 23°, the recommendation would be for the use of a back brace during juvenile growth in order to correct the spine. For individuals without treatment, health impact is primarily back pain, with moderate limitation in physical functioning, and decreased general health (Freidel et al. 2002). Simultaneously, in modern studies, individuals with untreated scoliosis have similar life expectancies as the general population (Weinstein et al. 2003). This suggests that this individual may have had an impairment affecting their back at Deir el-Medina.

7.12.3 Talocalcaneal Coalition in an Adult from TT291 (14167-14168)



Figure 7.35 Talocalcaneal Coalition of an adult from TT291 (14167-14168)

14167 and 14168 are the right talus and calcaneus of an adult. They were found fused together along the medial edge of the *sustentaculum tali*. There is also lipping on both the talus and calcaneus near the groove for the *flexor hallucis longus* and some lipping on the talus at the talonavicular facet.

Fusion between the tarsals (tarsal coalition) has been documented as resulting from degenerative stress, congenital anomaly, traumatic injury, and/or infectious disease (Aufderheide et al. 1998, 75) and talocalcaneal coalition is one of the most common forms of coalition between tarsals (Barnes 2012, 181). While some lipping is present, it is not extensive, and the lack of woven bone or additional layers of compact bone suggests this is more likely to be a congenital anomaly than reaction to joint degeneration, traumatic injury, or infectious disease.

When congenital, the fusion usually forms at the calcaneal sustentaculum tali as seen here (Barnes 2012, 180). This fusion “can cause a rigid, painful foot” and limit dorsiflexion (Barnes 2012, 182). It is also correlated with increased chances for ankle sprains (Snyder et al. 1981). Consequently, this individual would likely have had a slight physical limitation in movement, either due to pain, sprains, or rigidity in dorsiflexion. When placed within the context of the landscape of the Theban hills, this would have also added a physical limitation to this individual's movement among the tombs.

7.12.4 Fused Vertebral Column of an Adult from TT291 (14201)

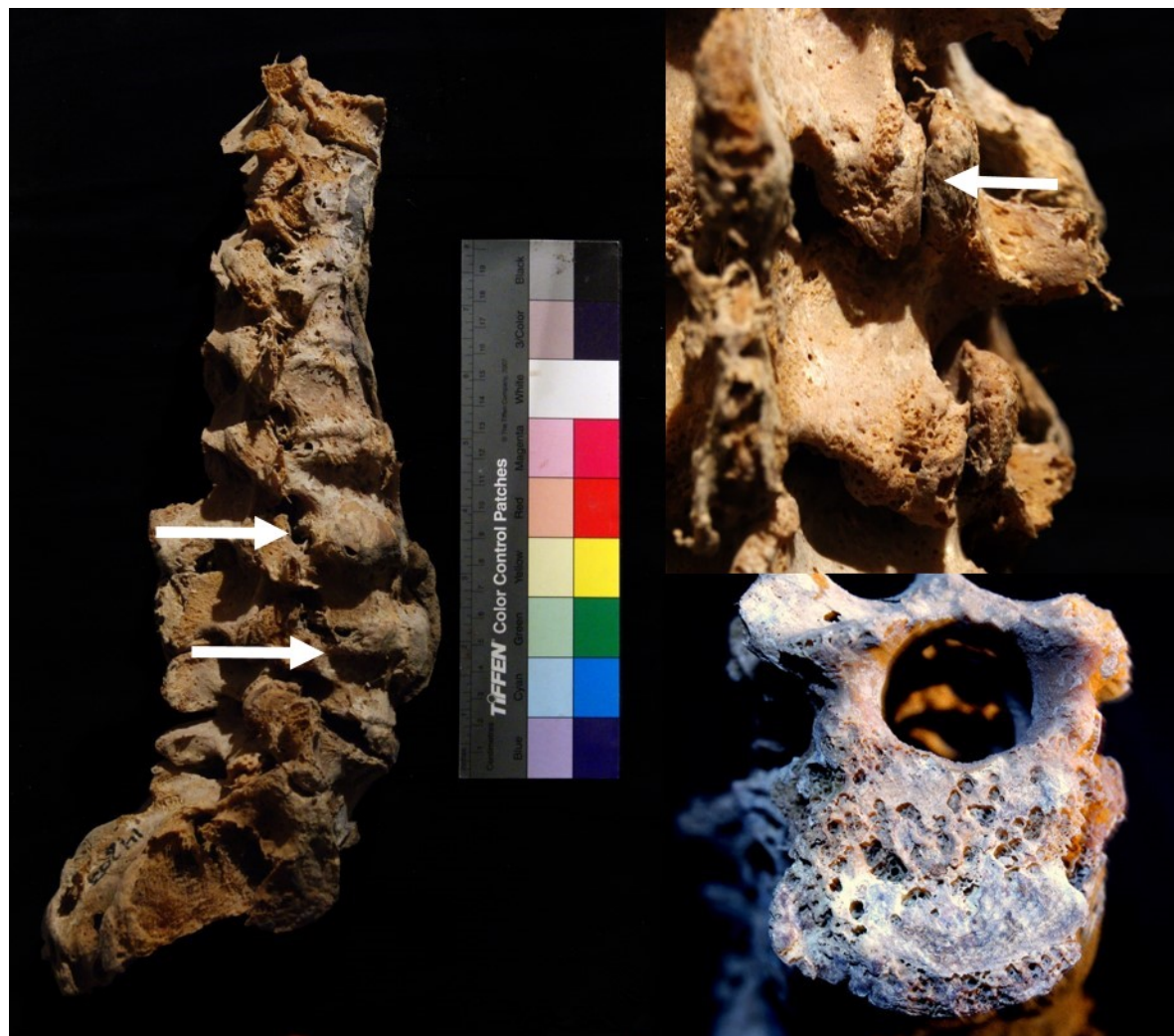


Figure 7.36 Fusion of the sacrum through the T8 of an adult from TT 291 (14201). Arrows indicate some of the bony bridges formed between the vertebral bodies that extend over the intervertebral discs (left). The posterior facets of these vertebrae were not fused (top right). The T8 of this vertebral column has extensive macroporosity in the superior body (bottom right).

An adult spinal column from TT291 (14201) was found fused from the sacrum through the T8 (Figure 7.36). The posterior facets are not involved, but the bodies of the vertebrae have symmetrical bone growths extending and fusing vertically across the space of the intervertebral discs. The space left for the intervertebral discs shows that the fusion was formed before the discs would have degenerated from vertebral

loading. The superior body of the T8 also shows extensive bone loss, with macroporosity throughout.

Several diseases of the joints can manifest in the spine and cause fusion of the vertebral bodies, including osteoarthritis, diffuse idiopathic skeletal hyperostosis (DISH), psoriatic arthritis, and ankylosing spondylitis. The preservation of intervertebral disc space in combination with a lack of purely horizontal bony bridges indicates this is probably not the result of osteophytosis, though it is likely that osteophytosis could still be involved. Additionally, the symmetrical distribution of lesions in combination with thinner bony bridges between vertebrae suggests it is not DISH (Aufderheide et al. 1998, 97-98; Mann and Hunt 2013, 77-78; Ortner 2003, 560; Resnick 1996, 385; Waldron 2008, 77), though DISH can have bilateral distribution in the lumbar vertebrae (Olivieri et al. 2009). DISH is usually described as having a “candle-wax appearance” owing to the fact that this disease ossifies the anterior longitudinal ligament. For 14201, the ossification appears less like the stereotypical ‘candle-wax’ texture of DISH (e.g., RCSHC/P 932; [Ortner 171-077](#)). Consequently, it is unlikely this is a case of DISH, though it cannot be completely ruled out.

The remaining possible diseases (psoriatic arthritis and ankylosing spondylitis) are seronegative spondyloarthropathies. The symmetrical distribution of lesions, in combination with continuous fusion from the sacrum to the T8 are both common to ankylosing spondylitis; skips in vertebrae exhibiting lesions and asymmetrical distribution are more common in psoriatic arthritis (Waldron 2008, 54). Resnick indicates that psoriatic arthritis usually has paravertebral ossification that is further from the body of the vertebrae than syndesmophytes and apophyseal joint ankylosis and osteoporosis are less frequent in psoriatic arthritis than in ankylosing spondylitis (1996, 270). Examples of ankylosing spondylitis (Surgicat RCSHC/P 441; [Ortner 160-](#)

[341](#), [Ortner 170-063](#)) offer no clear diagnosis, as 14201 does not have typical syndesmophytes seen in ankylosing spondylitis. Unfortunately, examples of psoriatic arthritis are rare in the paleopathological literature (Ortner 2003, 580), and while the lesions resemble radiographic descriptions of psoriatic arthritis (Resnick 1996, 270), the symmetrical distribution of lesions in 14201 are atypical (Aufderheide et al. 1998, 104; Resnick 1996, 270). Consequently, differential diagnosis between either disease is difficult and not done here.

Regardless of whether this represents psoriatic arthritis, ankylosing spondylitis, or DISH, the fusion of the sacrum through the T8 would have similarly impaired this individual, resulting in decreased mobility in the back that would have limited their ability to engage in heavier daily labor within the community.

7.13 SUMMARY OF HEALTH STATUS AT DEIR EL-MEDINA

The age distribution in the human remains at Deir el-Medina suggests that while about 13% of individuals at Deir el-Medina made it to an old age, nearly half of individuals who reached adulthood died by the age of 35. This age distribution was relatively similar between males and females, yet simultaneously, non-specific indicators of stress indicate that men would have experienced more stress than women both as children and adults.

This stress may have come from the expectations for work in the Valley of the Kings, and specifically, the hiking necessary to get to the royal tomb, workmen's huts, and village. The modern route following the ancient trail of the workmen involves an arduous ascent of more than 1,000 steps from Deir el-Medina to the cliffs along which workmen would have walked to the huts (Figure 7.37). Hikes in and out of the Valley of the Kings would have involved similar descents and ascents. These hikes from over the

Theban hills to both the workmen's huts and to the village are visible in the unusually high levels of degenerative joint disease at the ankle and knee of male elements. While the majority of female elements showed comparatively little degenerative joint disease in the lower limb, the most extreme examples of eburnation were both female and suggest that specific work-related activities for women in the village could have caused even more stress than that seen in males.



Figure 7.37 The modern path extending down the middle of the photo shows the path to and from the Village of Deir el-Medina

Work-related stress at Deir el-Medina may have been based on more than just the stress of the hike. The consistent time spent at the workman's huts and away from additional provisioning and care in the village would have also impacted health status,

just as demonstrated with the case of *Mr-Shm.t* in chapter five. This could explain why males had significantly higher amounts of infection as evidenced by tibial periostosis. These data also complement seasonal distributions of sick days documented in the absence from work texts that suggest infectious diseases were the dominant cause of patterns in short-term illness.

Given that the village was founded and supported in order to cut and decorate the royal tombs, it is significant that several members of the community had pathological lesions that would have limited their ability to negotiate the rocky landscape of the Theban hills. Men with coxa valga, like the post-pubescent male discussed above (13352), would not have been able to participate or even apprentice as workmen. Women with debilitating pathological lesions in the back (e.g., 130015) also would have been limited from arduous labor like grinding bread. Yet, their presence in this skeletal assemblage indicates that they were still integrated into the community, despite their limitations in participating in these activities. Moreover, several of these pathological examples were most likely developmental anomalies (e.g., coxa valga and scoliosis), indicating that these individuals would have had physical limitations even as children. Their presence in the assemblage demonstrates that despite the fact that the village was built for work on the tomb, family members with physical limitations preventing them from being members of the workforce could still be included in the community throughout childhood and as adults. These individual examples thus indicate that health care at Deir el-Medina would include long-term care where disabled individuals were assimilated and potentially even cared for within the community, despite limitations in their contribution to formalized work on the tomb and informalized work in the village.

8 COMPARING HEALTH AT DEIR EL-MEDINA

The previous chapter established the health status of the people at Deir el-Medina, with an emphasis on differences between males and females. These values, however, are hard to explain without comparison to other populations. How much of health status was a consequence of social stresses (e.g., insufficient health care, extensive working conditions) and how much was it a result of biological stresses (e.g., increased susceptibility, a higher presence of infectious disease)? Can we differentiate these stresses at all? Moreover, did the men and women buried at Deir el-Medina fare better or worse than other Egyptians from similar social, occupational, or temporal contexts?

To address these questions, I compare the health statuses of the people of Deir el-Medina with two different sets of sites. First, I compare them with similar populations from Egypt and Nubia. Specifically, I use comparative data from Amarna, Giza, Tombos, and the Tombs of the Nobles. Individuals buried at these sites represent both elite and working populations during the Old Kingdom and New Kingdom.

I demonstrate that health at Deir el-Medina was relatively better than royal working populations at Giza and Amarna due to less occupational stress. Simultaneously, while men and women at Deir el-Medina experienced more occupational stress in their daily work than the elite, they had fewer episodes of malnutrition and/or extreme disease than even the elite buried at Giza. I postulate that these differences are in part due to the unusual levels of access individuals at Deir el-Medina had to health care directly from the state.

Additionally, I compare health status at Deir el-Medina with the 65 sites and over 12,000 individuals of the Western Hemisphere Project (Steckel and Rose 2002).

These sites— which range in date from 5,000 B.C.E. to the 19th century and include locations covering the Western Hemisphere—allow me to assess how Deir el-Medina fits into a global history of health. Instead of comparing health status site-by-site, I use percentiles to compare Deir el-Medina with all 65 sites of the Western Hemisphere Project simultaneously, giving an idea of how the site fits in a general study of health status across the world.

8.1 OTHER SITES IN EGYPT AND NUBIA

I compared health status at Deir el-Medina to five other dynastic cemeteries from Egypt and Nubia: the south tombs cemetery at Amarna, the cemetery at Tombos, the Southeastern cemetery at Giza, the Western cemetery at Giza, and the Tombs of the Nobles (Figure 8.1). These sites were chosen based on the degree of prior bioarchaeological research, their period, and the social status of their population. Below, I demonstrate ways in which health at Deir el-Medina is significantly different from each group.



Figure 8.1 Map of comparative sites in Egypt and Nubia

8.1.1 Amarna

Amarna offers the most relevant direct comparison to Deir el-Medina owing to the overall similarities in its period and population. Amarna dates to a short period during the New Kingdom—a potential interlude during the occupation at Deir el-Medina—in which the royal craftsmen were moved from Thebes to Amarna, ancient Akhetaten, as part of a broader political and religious shift by Akhenaten.¹⁸⁸

The skeletal assemblage at Amarna from the South tombs cemetery has been analyzed since 2005 by the University of Arkansas, led by Jerome Rose. As of 2013, 357 individuals have been analyzed, consisting of 37% adults and 63% juveniles (Dabbs and Davis 2013). These remains likely represent the working population who would have been involved with the massive building projects required to grow an entire capital within a few short years. These individuals included both some of the more skilled laborers, perhaps even some who transferred from Deir el-Medina, as well as a larger proportion of unskilled laborers brought in from around Egypt. Demography at Amarna is unusual as the site was only occupied for one reign, and thus all of the adult individuals buried at Amarna were not actually born there (Rose and Zabecki 2009, 408). Consequently, it is possible to differentiate the health experience of those who were most likely born at Amarna (under fifteen years old), from those who moved to Amarna (over fifteen years old).

Data representing juvenile health at Amarna suggests that prior to living in Akhetaten, men and women had similar health statuses to the villagers of Deir el-Medina, but after arriving in Amarna, their health substantially deteriorated.¹⁸⁹ Deir el-Medina average stature estimates, when compared to data reported by Raxter during

¹⁸⁸ For general information about excavations at Amarna and the site's history, see Kemp (2012).

¹⁸⁹ Rates of linear enamel hypoplasias are currently unavailable in the published literature.

the New Kingdom at Amarna (2011, 124), are significantly higher for males (Table B.13; $t[78]=-2.42$, $p=0.0177$), but not for females (Table B.14; $t[85]=-1.18$, $p=0.242$). The values for males at Deir el-Medina, in fact, are much closer to—and even slightly higher than—the average stature for royalty during the New Kingdom which was 166.9 cm (Raxter 2011, 186). This indicates that during juvenile growth especially, males at Amarna would have experienced more stress. On the other hand, combined rates of cribra orbitalia and porotic hyperostosis are equal (23%) for both Amarna and Deir el-Medina (Table B.15; $\chi^2[1, n=306] = 0.0013$, $p=0.97$). Cribra orbitalia and porotic hyperostosis are more frequently associated with children, and thus are likely more illustrative of childhood health (Stuart-Macadam 1987). This could be reconstructed to indicate that while stress in childhood is similar, stress during later adolescent growth was higher at Amarna. These contradictory data illustrate the degree of stress particularly placed on juveniles at Amarna, data further corroborated by the unusually high mortality rates for subadults (Rose and Zabecki 2009, 411). Spondylolysis—a stress fracture (Resnick 1996, 730) causing the separation of the vertebral arch from the body of the vertebra—was also noted in an adolescent from Amarna (Kemp et al. 2013, 72), suggesting heavy adolescent workloads.

Stress at Amarna would have continued to be higher than at Deir el-Medina into adulthood as well. At Amarna, degenerative joint disease was present in 47.7% of the lower limb and 65.9% of the upper limb, with extreme manifestations in 21.6% and 13.7% of the lower limb and upper limb respectively (Kemp et al. 2013, 73). Though not broken down by joint region, these rates of degenerative joint disease are still noticeably higher than those found at Deir el-Medina as the highest score for any one joint is still under 40% and extreme manifestations in the form of eburnation were only present in four elements in the total sample from Deir el-Medina. Traumatic injuries to

the arms and legs were similarly much higher at Amarna than Deir el-Medina; fractures were found in 22% of upper limbs and 11% of lower limbs at Amarna (Kemp et al. 2013, 71), compared to only singular examples at Deir el-Medina that likely represent only 1-2% of individuals. Dangerous and strenuous workloads at Amarna would have thus severely hampered their overall health in comparison to Deir el-Medina in general.

Despite more stress in childhood and adolescence, as well as more dangerous and intense workloads at Amarna, certain aspects of overall health were better at the site. Reported dental data for Amarna (Zabecki and Rose 2010) suggest dental health was worse at Deir el-Medina due to higher rates of ante-mortem tooth loss (Table B.16; $\chi^2[1, n=128] = 8.6, p<0.003$), despite insignificantly different rates of dental decay (Table B.17; $\chi^2[1, n=128] = -0.434, p=0.52$).¹⁹⁰ As noted by Zabecki and Rose (2010, 9), dental data also varied between burial areas at Amarna, and may reflect differences in diet and lifestyle within the site, convoluting the data. Additionally, data on periostosis suggest much higher rates of infection at Deir el-Medina. From reported data at Amarna in 2010, only five out of 67 individuals had tibial periostosis (Zabecki and Rose 2010, 8-9), a difference that is significantly lower than at Deir el-Medina (Table B.18; $\chi^2[1, n=129] = 9.13, p<0.005$).

These overall health patterns from Deir el-Medina and Amarna demonstrate both cultural and ecological impacts on health status. On the one hand, higher amounts of degenerative joint disease and trauma at Amarna indicate this population endured dangerous and harder labor than at Deir el-Medina, particularly among men and adolescents. On the other hand, higher rates of infection at Deir el-Medina might point to ecological consequences of its position nearer to Thebes and a broader

¹⁹⁰ Data on abscesses and calculus are unavailable.

population, where infection could spread more readily. Alternatively, the fact that the population at Deir el-Medina required the use of water carriers may suggest that their reliance on standing water exposed them to more health risks.

8.1.2 Tombos

Health at Tombos is paradoxical to health at Amarna when compared to Deir el-Medina; aspects of health that were similar or worse at Amarna than Deir el-Medina (i.e., degenerative joint disease, porotic hyperostosis, and cribra orbitalia) are much better at Tombos, while areas that were comparatively healthier at Amarna than Deir el-Medina (i.e., dental health and tibial periostosis) are much worse at Tombos. These discrepancies suggest that while the individuals studied at Tombos may have experienced less occupational stress than at either Amarna or Deir el-Medina, their diet and exposure to infectious diseases would have been the highest of all three sites.

Tombos is located in northern Sudan. It was a colonial outpost during the New Kingdom, strategically located near a granite quarry and the third cataract. The site includes a New Kingdom period pyramid tomb of Siamun, a colonial administrator, around which archaeologists found a series of mudbrick chambers and shaft tombs. Artifacts and burial positions from the graves suggest the individuals buried at Tombos were “middle class” (Buzon 2004), though six of the bodies were recovered from near the pyramid and may represent more elite individuals from the site (Buzon 2004, 127). While the term middle class is difficult to define even now, Buzon uses it to differentiate their relative wealth as being both less than upper elite and higher than the simple graves of most Egyptians. While identifying the ethnicity of these individuals is contentious and complex, their burial treatment and associated artifacts

suggest they were Egyptians and Egyptianized Nubians (Smith 2003), and thus likely constituted the population required to run this site.

Michele Buzon (2004) has led the osteological research at this site, beginning with her dissertation on health status. This study constitutes the majority of bioarchaeological research on health status at the site, although there are some more recent studies of specific aspects of health at the site (Buzon and Bombak 2010; Schrader 2012). The burials from this site used in Buzon's dissertation (n=100) were primarily adults with only 15% subadults. There were 44 females and 30 males from this sample.

As a community placed somewhere between the upper elite and royal workforces, Tombos may be in some ways most similar to Deir el-Medina, yet their health profiles are the most complex to compare as the two sites trade-off relative advantages in health. Contrasting aspects of health and wellness between the two sites indicates that their lifestyles, and likely their health care, differed in both organization and efficacy. These differences may have led to a similar quality-of-life overall, but based on the human remains, the primary health issues would have been different.

Unlike at Deir el-Medina, Tombos men and women had relatively similar health statuses overall (Buzon 2004, 138). While males tended to have slightly higher scores for osteoarthritis, these were insignificantly different from females in all joints except the ankle (Schrader 2012, 66). As at Deir el-Medina, dental health was very similar between males and females, except for AMTL. However, there were greater amounts of AMTL among men than women at Tombos, the reverse trend from Deir el-Medina.

When compared to Deir el-Medina, it is evident that increased occupational stress among Deir el-Medina men account for differences in health between the two sites. Figure 8.2 shows the distribution of DJD by joint between Tombos and Deir el-

Medina; whereas the shoulder and hip are similar, the elbow, knee, and ankle have higher scores at Deir el-Medina. These three joints have significantly more DJD for males at Deir el-Medina than females, and thus the difference between the two sites is likely accounted for by higher amounts of occupational stress for men at Deir el-Medina.¹⁹¹

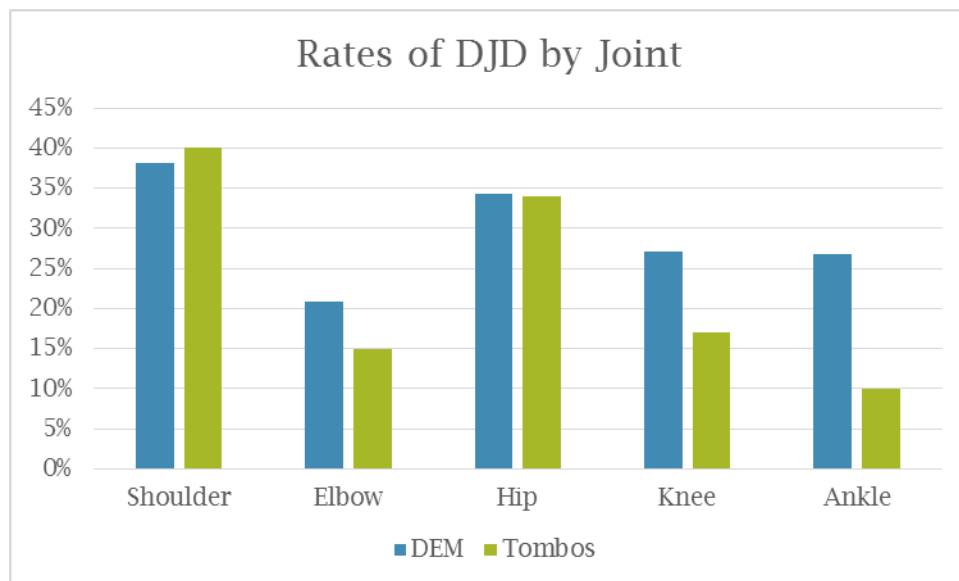


Figure 8.2 Rates of DJD between Deir el-Medina and Tombos

Diet was likely different at Tombos than at Deir el-Medina, as both men and women at Tombos had comparably worse dental health. In fact, their dental health was poorer than most sites in Egypt; 72% of adults had some form of AMTL, with nearly all males (91%) and most females (62%) missing one or more teeth ante-mortem (Buzon 2004; Buzon and Bombak 2010). These values are noticeably higher than those at Deir el-Medina (Table B.19; $\chi^2[1, n=127] = 8.77, p<0.003$). Abscesses are also significantly higher at Tombos (Table B.20; $\chi^2[1, n=118] = 7.91, p=0.005$), while rates of dental

¹⁹¹ These data cannot be compared statistically as the reported values for Tombos (Schrader 2012, fig. 5) do not include raw values or differentiation by sex.

decay, on the other hand, are nearly identical between the two sites (Table B.21; $\chi^2[1, n=125] = 0.003, p=0.96$).

Infection appears to have also been worse at Tombos than at Deir el-Medina as well, perhaps pointing to geographic differences in rates of infection between Upper Egypt and Nubia. The overall frequency of tibial periostosis at Tombos was 46.7%, a rate that is much higher than the 19% at Deir el-Medina (Table B.22; $\chi^2[1, n=129] = 9.13, p<0.005$).¹⁹² These rates are also significantly higher than data reported for Amarna and the Tombs of the Nobles.

Data on juvenile health are less straight-forward. The rate of cribra orbitalia was only 10.8%, and porotic hyperostosis was rarely present at Tombos. These rates are both lower than at Deir el-Medina, with significantly lower rates of cribra orbitalia than at Deir el-Medina (Table B.23; $\chi^2[1, n=139] = 7.12, p<0.01$). Linear enamel hypoplasias, on the other hand, had similar rates to Deir el-Medina (17% at DEM and 19% at Tombos, Table B.24; $p=0.562$, Fisher's exact test), though these rates are relatively low overall and may have too small a sample size for sufficient comparison. While male stature at Tombos was significantly lower than at Deir el-Medina (Table B.25; $t=-2.46, df=66, p<0.02$), female stature was virtually the same (Table B.26; $t=-0.223, df=68, p=0.82$). This perhaps reflects a pattern similar to Amarna, where adolescent males experience more stress than at Deir el-Medina, while overall, adults experience less or similar stress at Tombos to Deir el-Medina.

Individuals at both sites had relatively few traumatic injuries. At Tombos, there were no fractures found in the crania and only 9% of individuals (8/85) had post-cranial injuries (Buzon 2004, 133-134). These rates are similar to those at Deir el-

¹⁹² Rates of tibial periostosis at Tombos among males and females have insufficient sample sizes for comparison.

Medina, and suggest that even though Tombos represented a liminal space between Nubia and Egypt, interpersonal conflict was not a concern and hazardous workplace injuries were a minor aspect of health status for both sites.

Overall, low rates of DJD and trauma suggest that individuals buried at Tombos had less occupational stress than at Deir el-Medina, specifically in the lower limb. On the other hand, dental health was much worse at Tombos than at Deir el-Medina and most sites in Egypt in general. This may reflect different food preparation or diet at Tombos, a colonial Nubian site, than in the Egyptian Nile valley. Simultaneously, the higher presence of tibial periostosis at Tombos was also noticeable when compared to Deir el-Medina and other sites in Egypt in general, and suggests that either individuals at Tombos had less effective means of combatting disease, or that the ecology of Northern Sudan supports more infectious agents than in Upper and Lower Egypt.

8.1.3 Giza

The Giza southeastern cemetery offers a comparative assemblage of royal workmen, although both the nature of the labor force and period are much different. This worker's cemetery dates to the 4th through 5th dynasties of the Old Kingdom. At this time, labor was on a seasonal rotation, and the individuals buried here likely represent those who died during their time on the workforce. The massive amounts of labor required to build the pyramids would have required a workforce capable of such labor, but likely did not require the amount of artistic skills necessary for those from Deir el-Medina. Consequently, workers from the Giza cemetery, similar to those from Amarna, likely were predominantly unskilled laborers with less social capital than those from Deir el-Medina.

In tandem with the worker's remains from Giza, the human remains from the Western cemetery have also been studied. This area was reserved for Old Kingdom elite families, and allows a clear comparison between workers and the elite during the Old Kingdom. Published data for both cemeteries are presented together (Hussien et al. 2003; Hussien et al. 2006; Zaki et al. 2009). They compared these two data sets in terms of degenerative joint disease, linear enamel hypoplasias, and stature.

Unsurprisingly, they found that the population in the worker's cemetery showed consistently lower health status than the elite: their stature was shorter, they experienced more degenerative joint disease, and higher levels of linear enamel hypoplasias (Hussien et al. 2003; Hussien et al. 2006). Interestingly, the workmen at Deir el-Medina consistently fall between the values for these two cemeteries.

Rates of DJD exemplify this, as both Deir el-Medina males and females have less overall DJD than the Giza workers, but more than the elite. However, when we compare overall rates of DJD by sex, Deir el-Medina males are significantly different from Giza workmen (Table B.27; $\chi^2[1, n=468] = 4.19, p=0.04$), but not the elite (Table B.28; $\chi^2[1, n=826] = 2.09, p=0.148$). Conversely, Deir el-Medina females are not statistically different from female workers at Giza (Table B.29; $\chi^2[1, n=426] = 2.23, p=0.135$), but they are from Giza elite women (Table B.30; $\chi^2[1, n=706] = 12.26, p<0.0001$). These differences suggest that while Deir el-Medina workmen had to labor, the intensity of their labor was much lower than for those working at Giza. Simultaneously, women at Deir el-Medina had levels of stress that were more similar to stress for women among the workforce at Giza, which may corroborate their mutual positions as wives of workers who would be responsible for some of the household labor elite women would otherwise not need to perform.

These differences maintain themselves when statures are compared between Deir el-Medina and Giza. While Deir el-Medina men have significantly higher statures than Giza workmen (Table B.31; $t[80]=-2.28$, $p=0.03$), they have very similar statures to Giza elite (Table B.32; $t[114]=0.31$, $p=0.76$). On the other hand, the stature of Deir el-Medina women were significantly different from Giza elite (Table B.33; $t[95]=2.05$, $p=0.043$), yet much more similar to women in the workers' cemetery (Table B.34; $t[63]=-1.57$, $p=0.12$).

One final way to compare overall health between Giza and Deir el-Medina is through rates of linear enamel hypoplasias. Hussien and colleagues found significant differences in the rate of enamel hypoplasias between the workers (61%) and the elite (30%), based on the presence of LEH on observable incisors and canines (Hussien et al. 2006). These rates for the Giza workers (Table B.35; $\chi^2[1, n=204] = 55.3$, $p<0.0001$) and Giza elite (Table B.36; $\chi^2[1, n=228] = 13.91$, $p<0.0001$) are both significantly higher than overall rates at Deir el-Medina which were 9% for all adult incisors and canines. This is especially surprising given the elite status of those buried in the Giza Western cemetery. These differences demonstrate that in some ways, Deir el-Medina health statuses were higher than even elite health during the Old Kingdom.

8.1.4 Tombs of the Nobles

Individuals buried in the Tombs of the Nobles offer a strong comparison to the members of the Deir el-Medina community. These tombs—within walking distance from Deir el-Medina—were contemporaneous burial spaces for the Theban elite, and thus constitute an appropriate comparison to Deir el-Medina in assessing the impact of social status on health status.

The health of individuals from the tombs of the Nobles was published by Nerlich and colleagues (2000), with specific focus on individuals from TT 84, TT 85, and TT 95. These three tombs contained at least 273 individuals, of which 98 can be dated between the 18th and 22nd dynasties. Of these, 30 were male, 25 female, and 25 juvenile (Table 8.1). While in some cases it is possible to compare this entire data set with the remains from Deir el-Medina, the majority of analyses in this publication are based on the entire assemblage per tomb, including burials from later periods. Consequently, I will specifically compare the Deir el-Medina assemblage with burials in TT 95, as all burials from this tomb were dated between the 18th and 22nd dynasties.

Table 8.1 Published remains from Tombs of the Nobles (Nerlich et al. 2000)

Subgroup	TT84 shaft	TT 85 Shafts 1 and 2	TT95 (all areas)	Total
All individuals	15	10	73	98
Male	8	4	18	30
Female	4	3	18	25
Indeterminate Adults	0	1	17	18
Juvenile	3	2	20	25

TT 95 has been studied since 1991 by the German Archaeological Institute in conjunction with the University of Basel. The tomb was built by Meri, a high priest of Amun during the reign of Amenhotep II, and then reused in the 21st and 22nd dynasties. As at Deir el-Medina, heavy grave robbing left the human remains in fragments, and elements often had to be analyzed individually.

Bioarchaeological research was conducted primarily by Andreas Nerlich and Albert Zink (2000). Nerlich and Zink are both pathologists, and consequently publish data that are not completely comparable with bioarchaeological research projects. This means that I can only compare rates of the following aspects of health among the overall sample: caries, abscesses, trauma, and cribra orbitalia.

Overall, health among the New Kingdom and Third Intermediate Period burials in the Tombs of the Nobles show that they experienced less occupational stress, but otherwise would have had similar lifestyles to the villagers at Deir el-Medina. To begin, they likely had similar diets. Dental health was very similar between the two sites; the rate of dental decay between Deir el-Medina and TT95 were nearly identical (Table B.36; $\chi^2[1, n=146] = 0.0095, p=0.92$), and abscesses were present in 15% of individuals, an insignificantly lower rate than the 23% found at Deir el-Medina (Table B.37; $\chi^2[1, n=138] = 1.19, p=0.276$). Cribra orbitalia rates are also insignificantly different between the two sites (Table B.39; $\chi^2[1, n=94] = 2.6, p=0.107$), despite higher reported percentages in TT95 (Nerlich et al. 2000, 331).

The rate of degenerative joint disease, however, was less than 6% for remains from the New Kingdom and Third Intermediate Period burials at the Tombs of the Nobles (Nerlich et al. 2000, 336). While these rates are not broken down by joint, sex, or sample size, the overall rates appear to be much lower than those found at Deir el-Medina. Conversely, the rate of overall trauma was 12%, higher than the overall rate of trauma of 1-2% at Deir el-Medina based on the presence only one traumatic injury in the upper limb, lower limb, and cranium each at Deir el-Medina.¹⁹³ The higher rates of trauma are unexpected, but make it even more apparent how little trauma individuals actually experienced at Deir el-Medina. These higher rates of trauma may be a reflection of elite sports documented in artistic depictions such as fishing, hippo hunting, and chariot racing.

¹⁹³ Nerlich and colleagues do not specify the kinds of trauma they identify, but mention that most injuries are “healed fractures of the bones of the fore arms, the clavicae, but also the skull” (2000, 333). This suggests that traumatic lesions in the trunk, like vertebral compression fractures, were not common.

8.1.5 A Summary of Relative Health Status in Egypt

Comparative sites in Egypt paint a picture of the relative health status of men and women at Deir el-Medina. As children, they would have experienced less stress than many elite and non-elite populations. Rates of cribra orbitalia and porotic hyperostosis were lower than those at both Amarna and Giza. Stature was also relatively high, with male stature as high as average royal stature estimates during the New Kingdom. Less stress on children at Deir el-Medina could explain this when it is compared to working populations, as positions on the gang were competitive and it was often not until later adolescence that men were hired on as official workmen.

Grain rations and distributions of vegetables and other foods may also help to explain these differences, as the families at Deir el-Medina may have had consistent access to a more varied diet through the state. It is also interesting to note that unusually high levels of ante-mortem tooth loss for females are only noted at Deir el-Medina, further implying that these higher rates cannot be explained by diet alone.

As adults, the men and women at Deir el-Medina would have experienced levels of stress to be expected given the workmen's status as skilled laborers. The rates of degenerative joint disease fell between rates at elite and non-elite sites in both the Old and New Kingdoms. It is unsurprising that this kind of stress was lower at Deir el-Medina when compared to Amarna and Giza, given the extreme labor required to build the pyramids and the city of Akhetaten, yet these data show us that both men and women at Deir el-Medina would have had significantly higher physical stress than the elite, despite state assistance with daily chores such as bread grinding. These differences are particularly noteworthy for males in the knee and ankle, areas that would have been consistently strained during hikes to and from the Valley of the Kings. Additionally, traumatic injuries were relatively rare at Deir el-Medina,

highlighting the fact that daily labor was not as dangerous as the labor experienced by non-skilled labor forces in Amarna and Giza.

Rates of tibial periostosis highlight the fact that men at Deir el-Medina were especially prone to serious infection, and these rates are higher than both working populations (i.e., Amarna) and elite populations (i.e., Tombs of the Nobles). This highlights the fact that infectious diseases would have been a serious contributor to health problems at Deir el-Medina when compared to other sites in Egypt.

8.2 WESTERN HEMISPHERE PROJECT

The Western Hemisphere Project includes data on osteological health status at 65 different sites in North and South America. Percentiles allow us to compare Deir el-Medina to these 65 sites, situating health status at Deir el-Medina within the broader history of health. Further, these data help illustrate ways in which Egyptian health in general may have been divergent from health in the Western Hemisphere, and could thus begin to address how differences in environment, diet, and culture can manifest as significant differences in health status. As certain sites had limitations in terms of the data recorded or the number of individuals, for each observation I only compared sites with a sample of 10 or more elements per observation. The number of comparable sites is listed with each health status observation in Table 8.2. Additionally, this table includes the Deir el-Medina scores and percentiles. Percentiles closer to 100 represent healthier individuals for stature and femur length, while percentiles closer to zero represent healthier individuals for all other observations.

Table 8.2 Deir el-Medina percentiles as compared to the Western Hemisphere Project

Deir el-Medina's Health Status				
Measurement	Subgroup	Score	DEM Percentile	# of Sites
Femur Length	Adults	432.5	0.529	51
	Male	450.4	0.512	39
	Female	410.4	0.357	42
Stature Estimate	Adults	160.6	0.6	35
	Male	167.2	0.657	35
	Female	154.0	0.612	31
Percent with Tibial Infection	All	19%	0.476	63
	Male	33%	0.548	62
	Female	12%	0.288	59
Percent with LEH	All	17%	0.431	44
Percent with Cribra Orbitalia	All	29%	0.781	64
Percent with Porotic Hyperostosis	All	16%	0.65	63
Percent with DJD in the Shoulder and Elbow	Adults	26%	0.474	59
	Male	30%	0.491	57
	Female	17%	0.301	53
Percent with DJD in the Hip and Knee	Adults	29%	0.491	59
	Male	34%	0.551	58
	Female	22%	0.351	54
Percent with AMTL	Adults	46%	0.535	56
	Male	28%	0.16	48
	Female	59%	0.66	53
Percent with Abscesses	Adults	23%	0.192	52
	Male	28%	0.25	44
	Female	21%	0.16	42
Percent with Caries	Adults	26%	0.274	62
	Male	28%	0.272	55
	Female	26%	0.207	53
Percent with Skull Trauma	All	2%	0.283	53
Percent with Arm Trauma	All	1%	0.272	55
Percent with Leg Trauma	All	1%	0.392	56
Note: Sites with fewer than 10 observations were excluded				

8.2.1 Stature

Deir el-Medina adults are in the 53rd percentile for average femur length, but as potential stature varies by population, comparing absolute stature estimates is difficult and problematic. A more useful way of comparing stature is to evaluate the amount of variation in growth, under the assumption that larger disparities in adult femur length reflect lived disparities in the stress and malnutrition that affect growth.

When these variations are compared across all 65 sites in the Western Hemisphere, it is further possible to compare relative variation across sites by sex rather than attempting to compare between the sexes. This is important as females are less impacted by stress (Greulich 1951; Stinson 1985). Box plots of femur length for males (Figure 8.3) and females (Figure 8.4) at Deir el-Medina in red are placed among box plots for the 65 sites of the Western Hemisphere Project. While the interquartile range of males from Deir el-Medina is greater than for most sites in the Western Hemisphere Project, the interquartile range for females is comparably small. This suggests that, relative to other places, there was more variance in the amount of stress experienced by males at Deir el-Medina than females. It also suggests that females may have had more consistent care and nutrition than other populations.

The variance experienced by men at Deir el-Medina could be explained by what we know about their occupations. Even within the gang, workmen at Deir el-Medina could have had major differences in the amount of labor expected of them. Stone cutters, for example, would have experienced more stress than draftsmen, who in turn would have likely experienced more stress than scribes. As demonstrated in chapters three and four, different levels of literacy and disparities in wealth would have impacted the availability of health care within the community. Finally, evidence from chapter five suggests that despite having access to sick days, workmen in some cases would have still attempted to work through their illness. If these expectations varied based on an individual's role within the gang, it too could have impacted the amount of differentiation we see in stature.

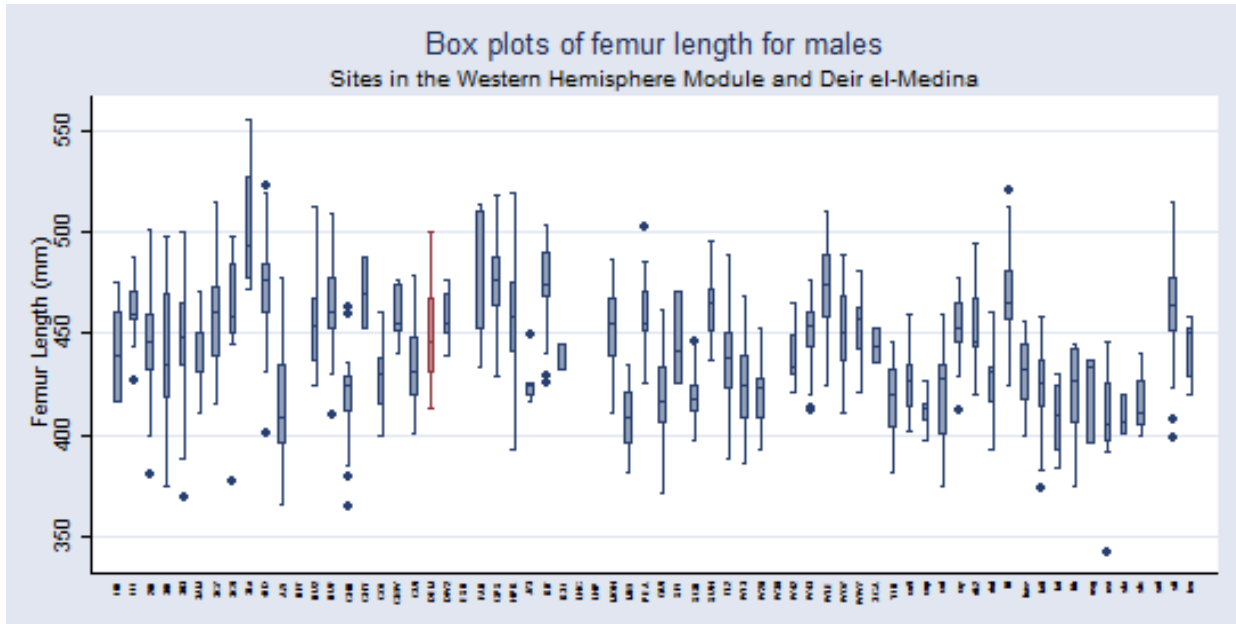


Figure 8.3 Box plots of femur length for males for sites in the Western Hemisphere Project and Deir el-Medina

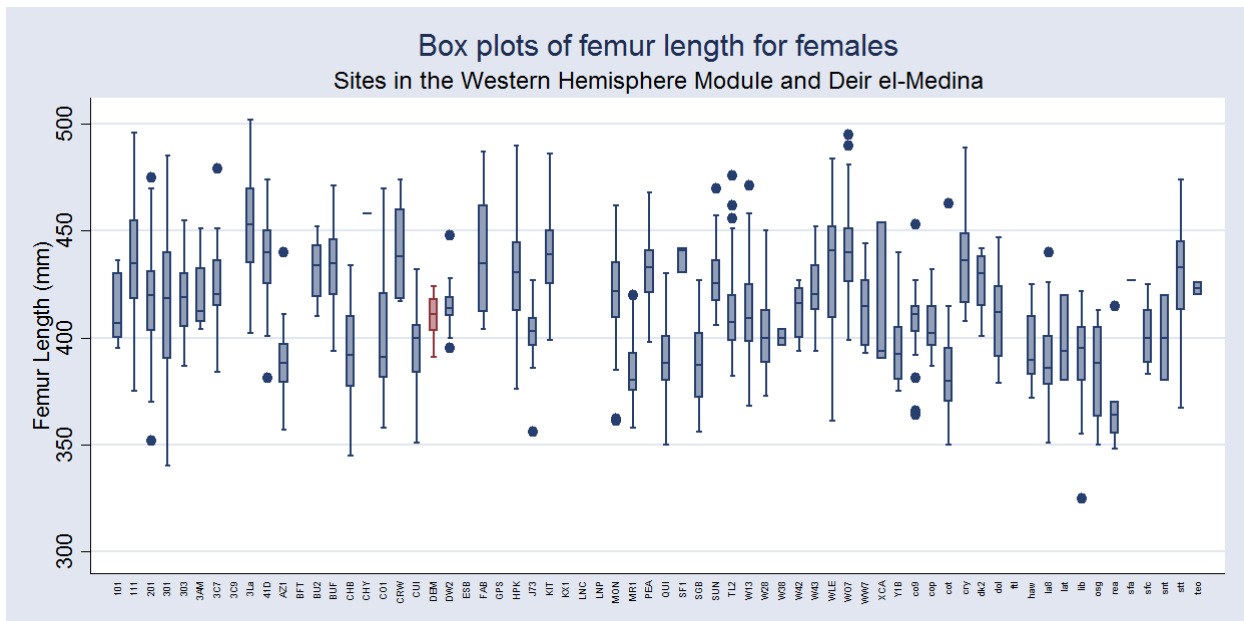


Figure 8.4 Box plots of femur length for females for sites in the Western Hemisphere Project and Deir el-Medina

8.2.2 Tibial Periostosis

Overall rates of tibial periostosis for Deir el-Medina are in the 48th percentile, but percentiles by sex are noticeably different with males scoring in the 55th percentile

while females score only in the 29th percentile. This discrepancy shows that while male levels of periostosis are only slightly above average when compared to broader populations, female levels are significantly below average. While overall, the population at Deir el-Medina may have experienced average amounts of infection, women were not only less prone than men, but these rates made their health status even higher than most comparable populations.

8.2.3 Degenerative Joint Disease

The rates of degenerative joint disease also point to relatively low levels of stress on females. For DJD in the shoulder, males at Deir el-Medina scored in the 49th percentile, while females scored in the 30th percentile. In the hip and knee, this difference is exaggerated with males scoring in the 55th percentile while females score in the 35th percentile. Again, this points to increased stress on males at Deir el-Medina, not only in comparison to females, but also to overall health patterns across other sites. These differences corroborate evidence that these differences are based on occupational stress, and not simply normal variation due to sex.

8.2.4 Non-specific Markers

Non-specific markers make health status at Deir el-Medina ambiguous. On the one hand, linear enamel hypoplasias scored in the 43rd percentile and suggest that the population at Deir el-Medina experienced less extreme stress or malnutrition than most populations as young children. On the other hand, percentiles for both cribra orbitalia (78th) and porotic hyperostosis (65th) are slightly worse than average. When we view these data in a histogram, it becomes apparent that a large number of sites have rates of cribra orbitalia (Figure 8.5) and porotic hyperostosis (Figure 8.6) below 5%. Of sites with rates above 5%, Deir el-Medina scores, highlighted in tan, fall in the middle.

This distribution shows that for many sites, individuals did not experience the degree of stress during childhood necessary to develop cribra orbitalia or porotic hyperostosis. Of the ones with sufficient stress to develop these lesions, rates at Deir el-Medina are average.

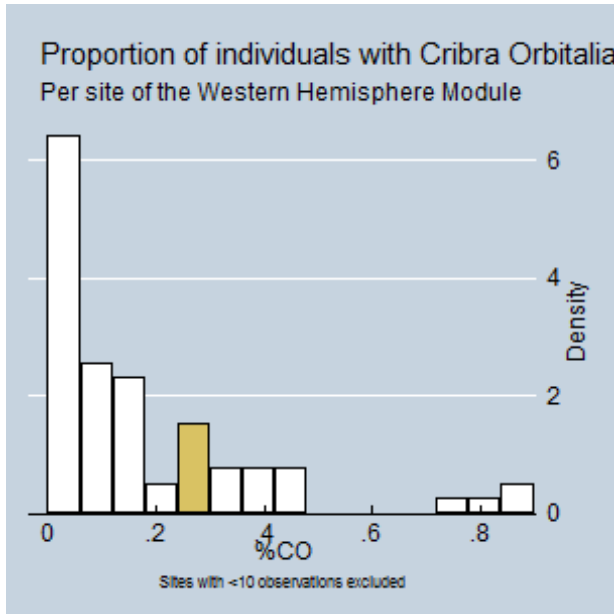


Figure 8.5 Histogram of cribra orbitalia rates per site of the Western Hemisphere Project

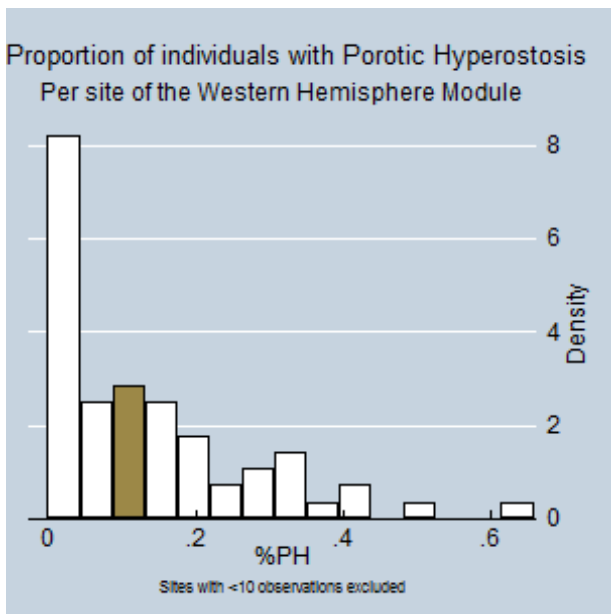


Figure 8.6 Histogram of porotic hyperostosis rates per site of the Western Hemisphere Project

8.2.5 Trauma

At Deir el-Medina, there was only one example of trauma in the skull, one in the upper limb, and one in the lower limb. While these score in the 28th, 27th, and 39th percentiles respectively, the overwhelming number of sites with one or fewer traumatic injuries to each area make lower end percentiles impractical as the distribution is based more on the sample size than the actual presence of traumatic injuries. Consequently, we can at least say that trauma was not a concern at Deir el-Medina, but that it was relatively uncommon in most of the sites documented in the Western Hemisphere Project.

8.2.6 Dental Health

Percentiles for dental health measures at Deir el-Medina suggest better dental health than most sites included in the Western Hemisphere Project. The relative presence of abscesses and dental decay are comparable between the sexes, and are low overall (19th percentile for abscesses and 27th percentile for dental decay). Percentiles for rates of ante-mortem tooth loss are similarly low for males (17th percentile) as well, but the percentile for females (66th percentile) is higher than average. This suggests that unusually high ante-mortem tooth loss among females at Deir el-Medina are atypical, especially when contextualized within the fact that all other dental metrics fall within the 17th and 27th percentiles.

8.2.7 A Summary of Health Status in comparison to the Western Hemisphere Project

Overall, people from Deir el-Medina exhibit less stress than most of the people documented in the 65 sites of the Western Hemisphere Project. They had slightly higher statures, fewer examples of tibial infection, fewer examples of linear enamel

hypoplasias, and less degenerative joint disease. While rates of ante-mortem tooth loss were higher due to unusually high levels among females, much lower rates of abscesses and dental decay suggest that overall dental health was also better than in most populations.

The only areas in which Deir el-Medina health status appeared to be lower than average were in rates of cribra orbitalia and porotic hyperostosis, which suggests that childhood health was lower than average at Deir el-Medina. When contextualized with other Egyptian sites, however, these rates were not particularly unusual. They were less than or similar to rates at Amarna and the Tombs of the Nobles. This suggests that in general, through either culture or environment, conditions in Egypt lead to higher amounts of childhood stress resulting in these higher than average rates of cribra orbitalia and porotic hyperostosis.

This wider comparison of Deir el-Medina to the Western Hemisphere Project also demonstrated that significant differences in male and female health were not just biological. When placed within the context of the Western Hemisphere Project, the relative scores for arthritis and tibial periostosis were exaggerated even further, with scores for males at Deir el-Medina often faring worse than average while females fared better. Moreover, greater variance in femur length, a cumulative measurement of general stress, shows that male health at Deir el-Medina was also significantly more variant, and likely represents the realities of more varied impacts on health based on one's role in the gang.

9 CONCLUSIONS

The primary objective of this dissertation is to define health status and health care networks at Deir el-Medina. This not only serves to explain the impact of health on daily life at Deir el-Medina, but also to demonstrate the social mechanisms necessary to thrive in the village. This research impacts broader scholarship in Egyptology and archaeology by providing both a means for accessing health care in past populations and specific evidence for ways that health was perceived, maintained, and impacted in ancient Egypt. The following discussion demonstrates the specific ways research presented in the preceding pages contributes to our understanding of life at Deir el-Medina, broader research on medicine and health in Egyptology, and future scholarship on health and health care in archaeology.

9.1 IMPLICATIONS OF THIS RESEARCH FOR HEALTH AND HEALTH CARE AT DEIR EL-MEDINA

This dissertation begins with three central research questions to explain how health care was constructed as a response to illness at Deir el-Medina. The first asks, what were the main stresses on health for men and women at Deir el-Medina, and how did their health compare to other analogous populations? In chapters six, seven, and eight specifically, I explore this question using original research on the human remains from tombs TT6, TT217, and TT291 at Deir el-Medina.

While men and women from Deir el-Medina generally fared better than most populations on an international scale, there were still two primary stresses that impacted health patterns at Deir el-Medina: repetitive strain from daily work and

illness from infectious disease. These differences are noticeably greater for men than women, and they are exaggerated even further when compared with other populations. They consequently are clearly not just biological, but represent cultural mechanisms of stress placed on men at Deir el-Medina. Specifically, repetitive strain from hiking in the Theban hills in conjunction with expectations for work would have taken a significant toll on the joints of men in the workforce at Deir el-Medina. Rates of cribra orbitalia and porotic hyperostosis suggest that these differences may have even started early on when young boys were expected to assist with work on the tomb by running errands and apprenticing.

This strain from work also resulted in significantly higher amounts of infection for men at Deir el-Medina—even higher than other analogous groups of elite and non-elite Egyptians from the Tombs of the Nobles and Amarna respectively. While this evidence for infection in human remains is limited to only the longest and most severe infections, texts can give us access to information about shorter-term diseases. Analysis of absence from work texts (chapter five) elucidates how much these infectious diseases would have impacted morbidity patterns of short term illness at the site. The seasonal distribution of absences due to illness follows a documented pattern in the Roman period and in the 16th through 20th centuries with a peak in illness during the early spring that consistently falls to a low by late autumn. This pattern matches changes in the overall virulence of infectious diseases in Upper Egypt, and suggests that infectious diseases were the dominant factor affecting morbidity patterns at the site. So how was health care designed, structured, and maintained to deal with infectious disease?

The dominant theory of disease transmission at Deir el-Medina was based on a concept of contamination (chapter three). This implies a concern for invisible,

causative disease agents, which could infect and therefore contaminate an individual. Medical care and texts therefore used this theoretical principle to treat those disease agents that could spread contagion: the dead, disease demons, the divine, magic, and poisonous animals whose venom physically personified contamination. These different disease agents specifically caused fevers and internal disorders, and likely represented emic perceptions of the spread of infectious disease in Egypt.

Professional, folk, and popular care providers were available to treat the sick at Deir el-Medina (chapter four). The *swnw*, physician, and *hrp-Srk.t*, scorpion charmer, were both professional care providers, paid by the state to create remedies and treatments for the members of the village community specifically. In conjunction with these professionals, the *rht*, wise woman, also served to help diagnose the sick. Additionally, family members were expected to provide popular care, in the form of nursing and provisioning. This expectation was maintained through social, legal, and fiscal ramifications, as well as the expectation of reciprocity. The presence of femora and vertebrae suggesting impairments that would have disabled individuals from participating in arduous work (chapter seven) also suggests that these networks could be counted on for long term care, and that disabled individuals could still be integrated into the community, even if that meant they would not be able to contribute to work on the royal tomb.

Yet, these networks were not universally accessible. The wealthy and elite at Deir el-Medina would have had unique access and privilege to medicine. High levels of literacy gave them access to medical texts, which were kept in private collections and developed to address the specific illnesses from which they suffered. These individuals would have had the capital to buy specific medical ingredients and private services. As members of the Deir el-Medina community, they would also get access to the

provisions and services provided by the state. It is no wonder that the scribe *Kn-hr-hpš=f* was able to take advantage of these various networks of health care to survive well past his fifties.

At the same time, any member within the community could also take advantage of state services, including the use of the doctor, provisioning of medical ingredients, and sick days from work. These mechanisms likely aided the population at Deir el-Medina in mitigating stresses from work and infection, resulting in their above average health status.

This demonstrates that the residents of Deir el-Medina had a complex health care system in place to directly address the specific diseases impacting health at the site. Through the combination of sponsored, professional care from the state and socially-regulated, private care within the village, the residents of Deir el-Medina were able to take advantage of their unique social status to contend with illness as a community.

9.2 RELEVANCE TO BROADER SCHOLARSHIP ON HEALTH AND HEALTH CARE IN ANCIENT EGYPT

As noted in the first chapter of this dissertation, the unique social position of Deir el-Medina often makes it difficult to compare it with other sites in ancient Egypt. So which aspects of health status and health care at Deir el-Medina pertain to broader research in Egyptology?

Additional evidence suggests that Deir el-Medina may not have been the only group to receive state-subsidized health care. In the first century BCE, Diodorus indicated that Egyptian physicians (*swnw*) were paid from public funds for military

expeditions (Lang 2013, 234), and lists of titles from quarrying expeditions during the Middle Kingdom suggests that a physician (*swnw*) and scorpion charmer (*hrp-Srk.t*) could be on staff (Halioua and Ziskind 2005, 139). P. Edwin Smith, which predominantly contains treatments for traumatic injuries to the head and torso, may even be a medical text constructed to respond to military health care specifically. These state projects may have thus had similar structures as Deir el-Medina for professional medical care. The data from Deir el-Medina indicates that in these cases, the physician and scorpion charmer most likely would have had a separate stipend and time allotted to take care of colleagues. Basic medical ingredients could also have been distributed as part of rations. Colleagues and supervisors in quarry expeditions and military campaigns may have reciprocated responsibilities as caretakers.

Moving beyond state-run projects, this dissertation also has implications for health care in ancient Egyptian villages in general. Evidence for popular care from family members at Deir el-Medina likely attests to the broader practice of reciprocal caretaking and the use of social pressure, through legal and fiscal ramifications, to ensure family support. Family members would take care of each other by safeguarding possessions, nursing, and providing clothing and food to support the sick.

Deir el-Medina is particularly well-suited to show the ways that wealth and literacy could allow individuals greater access to health care and medical knowledge in ancient Egypt. Scribes were able to maintain private medical collections that were customized to their health issues, increasing both their knowledge and modes of treatment for disease. Individuals with extra income could also commission private professional medical care in order to receive treatment.

Finally, the research presented in this dissertation has broad implications for Egyptological scholarship on medicine. It demonstrates that the concept of contamination was a dominant theory of disease transmission in the New Kingdom and Third Intermediate Period through the medical texts and the *Oracular Amuletic Decrees*. The construction of these medical texts—copies and expansions of earlier volumes—reveals that they represent long-standing beliefs. Consequently, contamination theory likely developed long before the New Kingdom and was probably extant throughout Egypt.

9.3 TOWARD AN ARCHAEOLOGY OF HEALTH CARE

This research is particularly valuable toward developing a broader archaeology of health care owing to Deir el-Medina's unique position: while part of one of the largest state civilizations in the ancient world, it was also an independent village of families. The health care system at Deir el-Medina reflects this diversity, and in turn, allows other researchers to adapt this study's implications toward their own archaeological and historical contexts.

My research demonstrates that governmentally subsidized sick leave, stipended professional physicians, and even state-distributed medicine are not just components of modern medical care, but were crucial aspects of health care at Deir el-Medina, extending our awareness of state-sponsored health care back thousands of years. Thus, archaeologists must consider the possibility of governmentally supported health care when discussing health and disease in the ancient world. Evidence from absences from work suggests that the presence of health care was not for the general well-being of the population, but rather to maintain productivity in state projects. Future research on health care in other centralized ancient civilizations should consider the state's

benefit to the overall health of different social groups and whether or not this carries similar weight in health care provided by the government. Archaeologists should consider how differences in health care provided within state-funded institutions could have impacted the relative health of these individuals when compared to the broader population.

Personal networks of care within the village at Deir el-Medina can also be used as a model of health care for archaeologists who are interested in smaller groups of only a few hundred individuals. Based on the health care network at Deir el-Medina, close family relationships and the ability to reciprocate care would strengthen one's personal care network. There was added incentive at Deir el-Medina when individuals could inherit property as a reward for providing care or when one could be publically shamed as a punishment for negligence. Scholars interested in smaller groups can use this model when considering the distribution of resources for health care among family units in the past and social strategies for maintaining stronger personal care networks.

Finally, and most importantly, this research highlights the need to consider health and health care when envisioning past cultures. Just as in our modern world, these topics permeated daily life at Deir el-Medina, whether through provisioning clothes for a sick relative, sharing rations with an injured colleague, or seeking treatment for a fever. Occupation and identity have far-reaching implications for overall health, and would have resulted in different access to medicine and care. Simultaneously, social networks were reinforced and solidified through taking care of friends, colleagues, and family. Health care consequently structured and was structured by society, making it a critical factor to expand our awareness of the social mechanisms behind not only surviving, but thriving in the ancient world.

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11 APPENDIX B: ADDITIONAL TABLES

Table B. 1 T-test of stature estimates at Deir el-Medina

Deir el-Medina stature estimates		
	Female	Male
\bar{x}	154.0	167.2
s	5.1	5.5
n	49	56
$t=-12.69$	$df=103$	$p<0.0001$

Table B. 2 Contingency table of tibial periostosis at Deir el-Medina

Tibial periostosis per element				
	Absent	Present	Sum	%
Male	27	13	40	33%
Female	38	5	43	12%
Fisher's Exact test (two-sided)	$p= 0.032$			

Table B. 3 Contingency table of childhood stress markers at Deir el-Medina

Childhood Stress Markers at Deir el-Medina				
	Absent	Present	Sum	%
Male	28	10	38	26%
Female	49	6	55	11%
Fisher's Exact test, 1-sided	$p=0.05$			

Note: Includes LEH, cribra orbitalia, and porotic hyperostosis

Table B. 4 Contingency table of DJD in the shoulder at Deir el-Medina

DJD in the Shoulder				
	Absent	Present	Sum	%
Male	47	29	76	38%
Female	15	11	26	42%
Pearson's chi-squared	$\chi^2[1, n=102] = 0.14$			$p=0.71$

Note: Includes observations for the humeral head and glenoid

Table B. 5 Contingency table of DJD in the Elbow at Deir el-Medina

DJD in the Elbow				
	Absent	Present	Sum	%
Male	53	3	56	5%
Female	51	15	66	23%
Fisher's Exact test	$p= 0.0093$			

Note: Includes observations for the capitulum, trochlea, and proximal ulna

Table B. 6 Contingency table of DJD in the Hip at Deir el-Medina

DJD in the Hip				
	Absent	Present	Sum	%
Male	46	21	67	31%
Female	40	26	66	39%
Pearson's chi-squared	$\chi^2[1, n=133] = 0.94$		$p=0.33$	

Note: Includes observations for the acetabulum and femoral head

Table B. 7 Contingency table of DJD in the knee at Deir el-Medina

DJD in the Knee				
	Absent	Present	Sum	%
Male	122	26	148	18%
Female	103	48	151	32%
Pearson's chi-squared	$\chi^2[1, n=299] = 8.11$		$p=0.004$	

Note: Includes observations for the medial and lateral condyles of the femur as well as the tibia

Table B. 8 Contingency table of DJD in the ankle at Deir el-Medina

DJD in the Ankle				
	Absent	Present	Sum	%
Male	34	3	37	8%
Female	22	10	32	31%
Fisher's Exact test	$p= 0.022$			

Note: Includes observations for the distal tibia and trochlea

Table B. 9 Contingency table of ante-mortem tooth loss per individual at Deir el-Medina

AMTL				
	Absent	Present	Sum	%
Male	15	6	21	29%
Female	11	16	27	59%
Pearson's chi-squared	$\chi^2[1, n=48] = 4.48$		$p=0.034$	

Table B. 10 Contingency table of abscesses per individual at Deir el-Medina

Abscesses				
	Absent	Present	Sum	%
Male	13	5	18	28%
Female	19	5	24	21%
Fisher's Exact test	$p= 0.43$			

Table B. 11 Contingency table of calculus per individual at Deir el-Medina

Calculus				
	Absent	Present	Sum	%
Male	10	8	18	44%
Female	12	8	20	40%
Fisher's Exact test (1-sided)	$p= 0.52$			

Table B. 12 Contingency table of dental decay per individual at Deir el-Medina

Dental decay				
	Absent	Present	Sum	%
Male	13	5	18	28%
Female	13	7	20	35%
Fisher's Exact test	$p= 0.45$			

Table B. 13 Contingency table of male stature between Deir el-Medina and Amarna

Male Stature Estimates		
	Amarna	DEM
\bar{x}	164	167.2
s	5.2	5.5
n	24	56
$t=-2.42$	$df=1$	$p=0.0177$

Note: Amarna data based on Raxter 2011

Table B. 14 Contingency table of female stature between Deir el-Medina and Amarna

Female Stature Estimates		
	Amarna	DEM
\bar{x}	162.7	167.2
s	6.9	5.5
n	12	56
$t=-1.18$	$df=85$	$p=0.242$

Table B. 15 Contingency table of porotic hyperostosis and cribra orbitalia rates between Deir el-Medina and Amarna

Porotic Hyperostosis and Cribra Orbitalia				
	Absent	Present	Sum	%
DEM	77	23	100	23%
Amarna	159	47	206	23%
Pearson's chi-squared	$\chi^2[1, n=306] = 0.0013$		$p=0.97$	

Table B. 16 Contingency table of ante-mortem tooth loss rates between Deir el-Medina and Amarna

AMTL				
	Absent	Present	Sum	%
Deir el-Medina	34	29	63	46%
Amarna	51	14	65	22%
Pearson's chi-squared	$\chi^2[1, n=128] = 8.6$		$p<0.003$	

Table B. 17 Contingency table of cavity rates between Deir el-Medina and Amarna

Cavity rates				
	Absent	Present	Sum	%
Deir el-Medina	46	17	63	27%
Amarna	44	21	65	32%
Pearson's chi-squared	$\chi^2[1, n=128] = -0.434$		$p=0.52$	

Table B. 18 Contingency table of rates of tibial periostosis between Deir el-Medina and Amarna

Tibial Periostosis				
	Absent	Present	Sum	%
Deir el-Medina	80	19	99	19%
Amarna	67	5	72	07%
Pearson's chi-squared	$\chi^2[1, n=129] = 9.13$		$p<0.005$	

Table B. 19 Contingency table of rates of AMTL between Deir el-Medina and Tombos

AMTL				
	Absent	Present	Sum	%
Deir el-Medina	34	29	63	46%
Tombos	18	46	64	72%
Pearson's chi-squared	$\chi^2[1, n=127] = 8.77$		$p<0.003$	

Table B. 20 Contingency table of rates of abscesses between Deir el-Medina and Tombos

Abscesses				
	Absent	Present	Sum	%
Deir el-Medina	41	12	53	23%
Tombos	34	31	65	48%
Pearson's chi-squared	$\chi^2[1, n=118] = 7.91$		$p=0.005$	

Table B. 21 Contingency table of rates of dental decay between Deir el-Medina and Tombos

Dental Decay				
	Absent	Present	Sum	%
Deir el-Medina	46	17	63	27%
Tombos	45	17	62	27%
Pearson's chi-squared	$\chi^2[1, n=125] = 0.003$		$p=0.96$	

Table B. 22 Contingency table of rates of tibial periostosis between Deir el-Medina and Tombos

Tibial Periostosis				
	Absent	Present	Sum	%
Deir el-Medina	80	19	99	19%
Tombos	16	14	30	47%
Pearson's chi-squared	$\chi^2[1, n=129] = 9.13$		$p<0.005$	

Table B. 23 Contingency table of rates of cribra orbitalia between Deir el-Medina and Tombos

Cribra Orbitalia				
	Absent	Present	Sum	%
Deir el-Medina	40	16	56	29%
Tombos	74	9	83	11%
Pearson's chi-squared	$\chi^2[1, n=139] = 7.12$		$p<0.01$	

Table B. 24 Contingency table of rates of linear enamel hypoplasias between Deir el-Medina and Tombos

Linear Enamel Hypoplasias				
	Absent	Present	Sum	%
DEM	15	3	18	17%
Tombos	51	12	63	19%
Fisher's Exact test, 1-sided	$p= 0.562$			

Table B. 25 Mean male stature estimates between Deir el-Medina and Tombos

Male Stature Estimates		
	Tombos	DEM
\bar{x}	162.7	167.2
s	6.9	5.5
n	12	56
$t=-2.46$	$df=66$	$p=0.0166$

Table B. 26 Mean female stature estimates between Deir el-Medina and Tombos

Female Stature Estimates		
	Tombos	DEM
\bar{x}	154.3	154
s	5.3	5.1
n	21	49
$t=-0.223$	$df=68$	$p=0.824$

Table B. 27 Contingency table of DJD rates between males from Deir el-Medina and Giza workers

Overall Male DJD				
	Absent	Present	Sum	%
Giza Workers	94	69	163	42%
Deir el-Medina	205	100	305	33%
Pearson's chi-squared	$\chi^2[1, n=468] = 4.19$			$p=0.04$

Table B. 28 Contingency table of DJD rates between males from Deir el-Medina and Giza elite

Overall Male DJD				
	Absent	Present	Sum	%
Deir el-Medina	205	100	305	33%
Giza Elite	375	146	521	28%
Pearson's chi-squared	$\chi^2[1, n=826] = 2.09$			$p=0.148$

Table B. 29 Contingency table of DJD rates between females from Deir el-Medina and Giza workers

Overall Female DJD				
	Absent	Present	Sum	%
Giza Workers	94	35	129	27%
Deir el-Medina	236	61	297	21%
Pearson's chi-squared	$\chi^2[1, n=426] = 2.23$			$p=0.135$

Table B. 30 Contingency table of DJD rates between females from Deir el-Medina and Giza elite

Overall Female DJD				
	Absent	Present	Sum	%
Deir el-Medina	236	61	297	21%
Giza Elite	364	45	409	11%
Pearson's chi-squared	$\chi^2[1, n=706] = 12.26$		$p < 0.0001$	

Table B. 31 T-test of male stature estimates between Giza workers and Deir el-Medina

Male Stature Estimates		
	Giza Workers	DEM
\bar{x}	164.1	167.2
s	6.2	5.5
n	26	56
$t = -2.28$	$df = 80$	$p = 0.03$

Table B. 32 T-test of male stature estimates between Giza elite and Deir el-Medina

Male Stature Estimates		
	Giza Elite	DEM
\bar{x}	167.5	167.2
s	5	5.5
n	60	56
$t = 0.31$	$df = 114$	$p = 0.76$

Table B. 33 T-test of female stature estimates between Giza workers and Deir el-Medina

Female Stature Estimates		
	Giza Workers	DEM
\bar{x}	151.7	154
s	5	5.1
n	16	49
$t = -1.57$	$df = 63$	$p = 0.12$

Table B. 34 T-test of female stature estimates between Giza elite and Deir el-Medina

Female Stature Estimates		
	Giza Elite	DEM
\bar{x}	156.1	154
s	5	5.1
n	48	49
$t = 2.05$	$df = 95$	$p = 0.043$

Table B. 35 Contingency table of rates of LEH between Deir el-Medina and Giza workers

Enamel Hypoplasias (presence in canines and incisors)				
	Absent	Present	Sum	%
Deir el-Medina	69	6	75	8%
Giza Workers	50	79	129	61%
Pearson's chi-squared	$\chi^2[1, n=204] = 55.3$		$p < 0.0001$	

Table B. 36 Contingency table of rates of LEH between Deir el-Medina and Giza elite

Enamel Hypoplasias (presence in canines and incisors)				
	Absent	Present	Sum	%
Deir el-Medina	69	6	75	8%
Giza Elite	107	46	153	30%
Pearson's chi-squared	$\chi^2[1, n=228] = 13.91$		$p < 0.0001$	

Table B. 37 Contingency table of dental decay between Deir el-Medina and the Tombs of the Nobles

Dental Decay				
	Absent	Present	Sum	%
Deir el-Medina	46	17	63	27%
TT95	60	23	83	28%
Pearson's chi-squared	$\chi^2[1, n=146] = 0.0095$		$p = 0.92$	

Table B. 38 Contingency table of abscesses between Deir el-Medina and the Tombs of the Nobles

Abscesses				
	Absent	Present	Sum	%
Deir el-Medina	41	12	53	23%
TT95	72	13	85	15%
Pearson's chi-squared	$\chi^2[1, n=138] = 1.19$		$p = 0.276$	

Table B. 39 Contingency table of cribra orbitalia between Deir el-Medina and the Tombs of the Nobles

Cribra Orbitalia				
	Absent	Present	Sum	%
Deir el-Medina	40	16	56	29%
TT95	21	17	38	45%
Pearson's chi-squared	$\chi^2[1, n=94] = 2.6$		$p = 0.107$	

12 WORKS CITED

- "#BlameMucus." 2014. *Mucinex*. <http://www.mucinex.com/blamemucus/>.
- Abdalla, Aly. 1988. "A Group of Osiris-Cloths of the Twenty-First Dynasty in the Cairo Museum." *The Journal of Egyptian Archaeology* 74: 157-64.
- Agarwal, Sabrina C., and Bonnie A. Glencross, eds. 2011. *Social Bioarchaeology*. Chichester, England: Wiley-Blackwell.
- Albanese, John, Hugo FV Cardoso, and Shelley R. Saunders. 2005. "Universal Methodology for Developing Univariate Sample-Specific Sex Determination Methods: An Example Using the Epicondylar Breadth of the Humerus." *Journal of Archaeological Science* 32 (1): 143-52.
- Albrecht, Gary L., Ray Fitzpatrick, and Susan C. Scrimshaw. 2000. *The Handbook of Social Studies in Health and Medicine*. London: Sage Publications, Inc.
- Albrecht, Gary L., Katherine Delores Seelman, and Michael Bury. 2001. *Handbook of Disability Studies*. 1st ed. Thousand Oaks: Sage Publications, Inc.
- Allen, James. 2005. *The Art of Medicine in Ancient Egypt*. New York: Metropolitan Museum of Art.
- Allgrove-McDowell, J. 1986. "Kahun: The Textile Evidence." In *The Pyramid Builders of Ancient Egypt: A Modern Investigation of Pharaoh's Workforce*, by A. Rosalie David, 226-47. London: Routledge.
- Altizer, Sonia, Andrew Dobson, Parvies Hosseini, Peter Hudson, Mercedes Pascual, and Pejman Rohani. 2006. "Seasonality and the Dynamics of Infectious Diseases." *Ecology Letters* 9 (4): 467-84. doi:10.1111/j.1461-0248.2005.00879.x.
- Andreu, Guillemette, ed. 2002. *Les Artistes de Pharaon: Deir El-Médineh et La Vallée Des Rois*. Paris: Brepols Publishers.
- Andrews, Carol. 1998. *Egyptian Mummies*. 2nd ed. Cambridge: Harvard University Press.
- Angel, J. Lawrence. 1966. "Porotic Hyperostosis, Anemias, Malaras, and Marshes in the Prehistoric Eastern Mediterranean." *Science* 153 (3737): 760-63.
- Armelagos, George J. 1969. "Disease in Ancient Nubia." *Science* 163 (3864): 255-59.
- Armelagos, George J., James H. Mielke, Kipling H. Owen, Dennis P. Van Gerven, John R. Dewey, and Paul Emil Mahler. 1972. "Bone Growth and Development in Prehistoric Populations from Sudanese Nubia." *Journal of Human Evolution* 1 (1): 89-119.

- Assmann, Jan. 2001. *The Search for God in Ancient Egypt*. Ithaca: Cornell University Press.
- Aufderheide, Arthur C. 2003. *The Scientific Study of Mummies*. Cambridge: Cambridge University Press.
- Aufderheide, Arthur C., Conrado Rodríguez-Martín, and Odin Langsjoen. 1998. *The Cambridge Encyclopedia of Human Paleopathology*. Cambridge: Cambridge University Press.
- Austin, Anne. 2014. "Mobilizing Archaeologists: Increasing the Quantity and Quality of Data Collected in the Field with Mobile Technology." *Advances in Archaeological Practice: A Journal of the Society for American Archaeology* 2 (1): 13-23.
- Bardinet, Thierry. 1995. *Les papyrus médicaux de l'Égypte pharaonique: Traduction intégrale et commentaire*. Paris: Fayard.
- Barnes, Ethne. 2012. *Atlas of Developmental Field Anomalies of the Human Skeleton: A Paleopathology Perspective*. Hoboken: John Wiley & Sons.
- Bentley, R. Alexander. 2006. "Strontium Isotopes from the Earth to the Archaeological Skeleton: A Review." *Journal of Archaeological Method and Theory* 13 (3): 135-87. doi:10.1007/s10816-006-9009-x.
- Bertalanffy, Ludwig von. 1973. *General System Theory: Foundations, Development, Applications*. New York: George Braziller, Inc.
- Bierbrier, M. L. 1975. *The Late New Kingdom in Egypt (c. 1300-664 B.C.): A Genealogical and Chronological Investigation*. Warminster: Liverpool Monographs in Archaeology and Oriental Studies.
- . 1980. "Terms of Relationship at Deir El-Medina." *The Journal of Egyptian Archaeology* 66 (January): 100-107. doi:10.2307/3856393.
- . 1982. *The Tomb-Builders of the Pharaohs*. London: British Museum Publications.
- Blakely, Robert L, ed. 1977a. *Biocultural Adaptation in Prehistoric America*. Southern Anthropological Society Proceedings 11. Athens: University of Georgia Press.
- . 1977b. "Introduction: Changing Strategies for the Biological Anthropologist." In *Biocultural Adaptation in Prehistoric America*, edited by Robert L Blakely, 1-9. Proceedings of the Southern Anthropological Society 11. Athens: University of Georgia Press. <http://core.tdar.org/document/176871>.
- Bohleke, B. 1997. "An Oracular Amuletic Decree of Khonsu in the Cleveland Museum of Art." *Journal of Egyptian Archaeology* 83: 155-67.
- Borghouts, J.F. 1978. *Ancient Egyptian Magical Texts*. London, Brill.

- . 1982. "Divine Intervention in Ancient Egypt and Its Manifestation (b3w)." In *Gleanings from Deir El-Medina*, edited by R.J. Demarée and J.J. Janssen, 1-70. Leiden: Nederlands Instituut voor het Nabije Oosten.
- Borghouts, J.F., K. Donker van Heel, Ben Haring, R.J. Demarée, and Jaana Toivari-Viitala. 1998. "The Deir El-Medina Database." *The Deir El-Medina Database*. <http://www.leidenuniv.nl/nino/dmd/dmd.html>.
- Bourdieu, P. 1977. *Outline of a Theory of Practice*. Cambridge: Cambridge University Press.
- Breasted, James Henry. 1930. *The Edwin Smith Surgical Papyrus: Hieroglyphic Transliteration, Translation and Commentary*. Chicago: University of Chicago Press.
- Brickley, Megan, and Rachel Ives. 2008. *The Bioarchaeology of Metabolic Bone Disease*. Amsterdam: Academic Press.
- Brooks, Sheilagh, and Judy M. Suchey. 1990. "Skeletal Age Determination Based on the Os Pubis: A Comparison of the Acsádi-Nemeskéri and Suchey-Brooks Methods." *Human Evolution* 5 (3): 227-38.
- Brown, Peter J., and Marcia C. Inhorn, eds. 2003. *The Anthropology of Infectious Disease: International Health Perspectives*. London: Routledge.
- Bruyère, B., and C. Kuentz. 1926. *Tombes thébaines: la nécropole de Deir el-Médineh; la tombe de Nakht-Min et la tombe d'Ari-Nefer*. Mémoires publiés par les membres de l'Institut français d'archéologie du Caire 54. Cairo: Institut français d'archéologie orientale.
- Bruyère, Bernard. 1925. *Rapport sur les fouilles de Deir El Médineh (1923-1924)*. Fouilles de l'Institut français d'archéologie orientale du Caire 2. Cairo: Institut français d'archéologie orientale.
- . 1926. *Rapport sur les fouilles de Deir El Médineh (1924-1925)*. Fouilles de l'Institut français d'archéologie orientale du Caire 3. Cairo: Institut français d'archéologie orientale.
- . 1953. *Rapport sur les fouilles de Deir El Médineh (1948 à 1951)*. Fouilles de l'Institut français d'archéologie orientale du Caire 26. Cairo: Institut français d'archéologie orientale.
- Buikstra, Jane E. 1977. "Biocultural Dimensions of Archeological Study: A Regional Perspective." In *Biocultural Adaptation in Prehistoric America*, edited by Robert L. Blakely, 67-84. Proceedings of the Southern Anthropological Society 11. Athens: University of Georgia Press. <http://core.tdar.org/document/176871>.
- Buikstra, Jane E., B. J. Baker, and D. C. Cook. 1993. "What Diseases Plagued Ancient Egyptians? A Century of Controversy Considered." In *Biological Anthropology*

- and the Study of Ancient Egypt*, edited by W. Vivian Davies and Roxie Walker, 24-53. London: British Museum Press.
- Buikstra, Jane E., and Douglas Ubelaker. 1994. *Standards for Data Collection from Human Skeletal Remains: Proceedings of a Seminar at the Field Museum of Natural History*. Arkansas Archeological Survey Research Series 44. Fayetteville: Arkansas Archeological Survey.
- Buzon, Michele R. 2004. "A Bioarchaeological Perspective on State Formation in the Nile Valley". Ph.D. Dissertation, University of California - Santa Barbara.
- Buzon, Michele R., and A. Bombak. 2010. "Dental Disease in the Nile Valley during the New Kingdom." *International Journal of Osteoarchaeology* 20 (4): 371-87. doi:10.1002/oa.1054.
- Callahan, Daniel. 1973. "The WHO Definition of 'Health.'" *The Hastings Center Studies* 1 (3): 77-87. doi:10.2307/3527467.
- Carberry, George A., B. Dustin Pooler, Neil Binkley, Travis B. Lauder, Richard J. Bruce, and Perry J. Pickhardt. 2013. "Unreported Vertebral Body Compression Fractures at Abdominal Multidetector CT." *Radiology* 268 (1): 120-26. doi:10.1148/radiol.13121632.
- Castriota-Scanderbeg, Alessandro, and Bruno Dallapiccola. 2005. *Abnormal Skeletal Phenotypes: From Simple Signs to Complex Diagnoses*. Berlin: Springer.
- Černý, Jaroslav. 1939. *Late Ramesside letters*. Bibliotheca aegyptiaca 9. Bruxelles: Édition de la Fondation égyptologique Reine Élisabeth.
- . 1945. "The Will of Naunakhte and the Related Documents." *The Journal of Egyptian Archaeology* 31: 29-53. doi:10.2307/3855381.
- . 1954. "Prices and Wages in Egypt during the Ramesside Period." *Cahiers D'histoire Mondial* 1 (4): 903-21.
- . 1973. *A Community of Workmen at Thebes in the Ramesside Period*. Bibliothèque D'étude 50. Cairo: Institut français d'archéologie orientale.
- Chamberlain, Geoffrey. 2004. "Historical Perspectives on Health Childbirth in Ancient Egypt." *The Journal of the Royal Society for the Promotion of Health* 124 (6): 284-86. doi:10.1177/146642400412400618.
- Clark, John Grahame Douglas. 1972. *Star Carr: A Case Study in Bioarchaeology*. Reading: Addison-Wesley.
<http://www.bcin.ca/Interface/openbcin.cgi?submit=submit&Chinkey=32693>.
- Clarysse, Willy. 1988. "A Demotic Self-Dedication to Anubis." In *Enchoria: Zeitschrift Für Demotistik Und Koptologie*, 16:7-10. Wiesbaden: Harrassowitz Verlag.

- Cobb, JR. 1948. "Outline for the Study of Scoliosis." *American Academy of Orthopaedic Surgeons Instructional Course Lectures* 5: 261-75.
- Cockburn, Aidan, Eve Cockburn, and Theodore A. Reyman. 1998. *Mummies, Disease and Ancient Cultures*. Cambridge: Cambridge University Press.
- Cohen, Mark Nathan, and George J Armelagos, eds. 1984. *Paleopathology at the Origins of Agriculture*. Proceedings of the Conference on Paleopathology and Socioeconomic Change at the Origins of Agriculture. New York: Academic Press.
- Collier, Mark. 2004. *Dating Late XIXth Dynasty Ostraca*. Leiden: Nederlands Instituut voor het Nabije Oosten.
- Conrad, Lawrence I., and D. Wujastyk, eds. 2000. *Contagion: Perspectives from Pre-Modern Societies*. Aldershot: Ashgate.
- Cook, Della Collins, and Mary Lucas Powell. 2006. "The Evolution of American Paleopathology." In *Bioarchaeology: The Contextual Analysis of Human Remains*, edited by Jane E. Buikstra and Lane A. Beck, 281-323. Amsterdam: Academic Press.
- Cooney, Kathlyn M. 2007. *The Cost of Death: The Social and Economic Value of Ancient Egyptian Funerary Art in the Ramesside Period*. Egyptologische Uitgaven 22. Leiden: Nederlands Instituut voor het Nabije Oosten.
- . 2010. "Gender Transformation in Death: A Case Study of Coffins from Ramesside Period Egypt." *Near Eastern Archaeology* 73 (4): 224-37.
- Cross, Morag. 2007. "Accessing the Inaccessible: Disability and Archaeology." In *The Archaeology of Identities*, edited by Timothy Insoll, 179-94. New York: Routledge.
- Crowfoot, Grace Mary Hood. 1931. *Methods of Hand Spinning in Egypt and the Sudan*. Halifax: F. King & Sons.
- Dabbs, Gretchen R. 2010. "Sex Determination Using the Scapula in New Kingdom Skeletons from Tell El-Amarna." *HOMO - Journal of Comparative Human Biology* 61 (6): 413-20. doi:10.1016/j.jchb.2010.09.001.
- Dabbs, Gretchen R., and Heidi S. Davis. 2013. *Human Bones from the South Tombs Cemetery. The 2013 Study Season*. Amarna Project Annual Reports. <http://www.amarnaproject.com/documents/pdf/STC-2013-bioarchaeology.pdf>.
- David, A. R., and V. Garner. 2003. "Asru, An Ancient Egyptian Temple Chantress: Modern Spectrometric Studies As Part of the Manchester Egyptian Mummy Research Project." In *Molecular and Structural Archaeology: Cosmetic and Therapeutic Chemicals*, edited by Georges Tsoucaris and Janusz Lipkowski, 153-62. NATO ASI Series 117. Amsterdam: Springer. http://link.springer.com/chapter/10.1007/978-94-010-0193-9_14.

- David, A. Rosalie. 2004. "Rationality versus Irrationality in Egyptian Medicine in the Pharaonic and Graeco-Roman Periods." In *Magic And Rationality In Ancient Near Eastern And Graeco-Roman Medicine*, edited by Herman F. J. Horstmanshoff and Marten Stol, 133–51. Studies in Ancient Medicine 27. Leiden: Brill.
- . 2008. *Egyptian Mummies and Modern Science*. New York: Cambridge University Press.
- Davies, Benedict. 1999. *Who's Who at Deir El-Medina: A Prosopographic Study of the Royal Workmen's Community*. Leiden: Nederlands Instituut voor het Nabije Oosten.
- Dawson, W. R., and P. H. Gray. 1968. *Catalogue of Egyptian Antiquities in the British Museum, Volume 1. Mummies and Human Remains*. London: The Trustees of the British Museum.
- Dayer, Romain, Thierry Haumont, Wilson Beliaeff, and Pierre Lascombes. 2013. "Idiopathic Scoliosis: Etiological Concepts and Hypotheses." *Journal of Children's Orthopaedics* 7 (1): 11–16. doi:10.1007/s11832-012-0458-3.
- De Jonghe, Daniel. 1985. "Linnen Doeken En Mummiewindsels van Het Oude En Het Mid- Denrijk." *Bulletin Des Musees Royales d'Art et d'Histoire*, no. 56: 5–33.
- Deines, Hildegard von, and Hermann Grapow. 1959. *Wörterbuch der ägyptischen Drogennamen*. Berlin: Akademie-Verlag.
- Deir el-Medine Online. 2009. "Berlin P 11247." <http://dem-online.gwi.uni-muenchen.de/fragment.php?id=209>.
- Demarée, R.J. 2010. "The Organization of Labour among the Royal Necropolis Workmen of Deir al-Medina. A Preliminary Update." In *L'organisation du travail en Egypte ancienne et en Mésopotamie*, edited by Bernadette Menu, 185–92. Bibliothèque d'Étude 151. Cairo: Institut français d'archéologie orientale.
- Demarée, R.J., B.J.J. Haring, W. Hovestreydt, and L.M.J. Zonhoven. 2012. "A Systematic Bibliography on Deir El-Medina." *The Deir El-Medina Database*. <http://www.wepwawet.nl/dmd/bibliography.htm>.
- Demarée, R.J., and Dominique Valbelle. 2011. *Les registres de recensement du village de Deir el-Médineh: (le "Stato civile")*. Leuven: Peeters.
- Depuydt, Leo. 1995. "On the Consistency of the Wandering Year as Backbone of Egyptian Chronology." *Journal of the American Research Center in Egypt* 32 (January): 43–58. doi:10.2307/40000829.
- Dettwyler, Katherine A. 1991. "Can Paleopathology Provide Evidence for 'compassion'?" *American Journal of Physical Anthropology* 84 (4): 375–84.
- Dieleman, Jacco. In Press. "Cultural Constructions of Ambiguous or Unsanctioned Ritual: Egypt." In *Handbook of Ancient Magic*. London: Brill.

- . 2011. "Scribal Practices in the Production of Handbooks in Egypt." *Continuity and Innovation in the Magical Tradition* 15: 85-117.
- . 2014. "The Materiality of Textual Amulets in Ancient Egypt," paper presented at the 65th Conference of the American Research Center in Egypt. Portland, OR, April 4-6.
- DiMatteo, M. Robin. 1991. *The Psychology of Health, Illness, and Medical Care: An Individual Perspective*. Pacific Grove: Brooks/Cole.
- Dittrick, Jean, and Judy Myers Suchey. 1986. "Sex Determination of Prehistoric Central California Skeletal Remains Using Discriminant Analysis of the Femur and Humerus." *American Journal of Physical Anthropology* 70 (1): 3-9.
- Dodson, Aidan. 2000. "The Late Eighteenth Dynasty Necropolis at Deir El-Medina and the Earliest 'Yellow' Coffin of the New Kingdom." In *Deir El-Medina in the Third Millennium AD: A Tribute to Jac. J. Janssen*, edited by R.J. Demarée and A. Egberts, 89-100. Egyptologische Uitgaven 14. Leiden: Nederlands Instituut voor het Nabije Oosten.
- Dorn, Andreas. 2011. *Arbeiterhütten im Tal der Könige: ein Beitrag zur altägyptischen Sozialgeschichte aufgrund von neuem Quellenmaterial aus der Mitte der 20. Dynastie (ca. 1150 v. Chr.)*. 3 vols. Basel: Schwabe Verlag.
- Douglas, Mary. 1966. *Purity and Danger: An Analysis of Concepts of Pollution and Taboo*. London: Routledge.
- Dunand, Françoise, and Roger Lichtenberg. 2006. *Mummies and Death in Egypt*. 1st ed. Ithaca: Cornell University Press.
- Duray, Stephen M. 1996. "Dental Indicators of Stress and Reduced Age at Death in Prehistoric Native Americans." *American Journal of Physical Anthropology* 99 (2): 275-86. doi:10.1002/(SICI)1096-8644(199602)99:2<275::AID-AJPA5>3.0.CO;2-Y.
- Dyck, Erika, and Christopher Fletcher. 2010. *Locating Health: Historical and Anthropological Investigations of Health and Place*. London: Pickering & Chatto Ltd.
- Edwards, Iorwerth Eiddon Stephen. 1960a. *Oracular Amuletic Decrees of the Late New Kingdom*. Vol. I. Text. London: Trustees of the British Museum.
- . 1960b. *Oracular Amuletic Decrees of the Late New Kingdom*. Vol. II. Plates. London: Trustees of the British Museum.
- Edwards, Iorwerth Eiddon Stephen, and Sydney Smith. 1938. *A Handbook to the Egyptian Mummies and Coffins Exhibited in the British Museum*. London: British Museum.

- El-Najjar, Mahmoud Y., Dennis J. Ryan, Christy G. Turner, and Betsy Lozoff. 1976. "The Etiology of Porotic Hyperostosis among the Prehistoric and Historic Anasazi Indians of Southwestern United States." *American Journal of Physical Anthropology* 44 (3): 477-87. doi:10.1002/ajpa.1330440311.
- Engel, G. L. 1977. "The Need for a New Medical Model: A Challenge for Biomedicine." *Science* 196 (4286): 129-36. doi:10.1126/science.847460.
- Engelmann, Heinz, and Jochen Hallof. 1996. "Der Sachmetpriester, Ein Früher Repräsentant Der Hygiene Und Des Seuchenschutzes." *Studien Zur Altägyptischen Kultur* 23 (January): 103-46.
- Erman, Adolf, and Hermann Grapow. 1926. *Wörterbuch der ägyptischen Sprache*. Vol. I-VI. Berlin: Akademie-Verlag.
- Espada, Jesús Trello. 2001. "Revuelta En 'Pa Demi'; Consideraciones Acerca de La Huelga Obrera Del Año 29 de Ramses III." *Boletín de La Asociación Española de Egiptología*, no. 11: 63-94.
- Eyre, Christopher J. 1984. "A Draughtsman's Letter from Thebes." *Studien Zur Altägyptischen Kultur* 11: 195-207.
- . 1987. "Work and the Organisation of Work in the Old Kingdom." *Labor in the Ancient Near East*, 5-47.
- Ezzamel, Mahmoud. 2012. *Accounting and Order*. Hoboken: Routledge.
- Feucht, Erika. 1995. *Das Kind im Alten Ägypten: die Stellung des Kindes in Familie und Gesellschaft nach altägyptischen Texten und Darstellungen*. Frankfurt: Campus.
- Finniss, Damien G, Ted J Kaptchuk, Franklin Miller, and Fabrizio Benedetti. 2010. "Biological, Clinical, and Ethical Advances of Placebo Effects." *The Lancet* 375 (9715): 686-95. doi:10.1016/S0140-6736(09)61706-2.
- Fischer-Elfert, Hans-Werner. 1996. "Two Oracle Petitions Addressed to Horus-Khau with Some Notes on the Oracular Amuletic Decrees (P. Berlin P. 8525 and P. 8526)." *The Journal of Egyptian Archaeology* 82: 129. doi:10.2307/3822118.
- . 2009. "Heilkunde im Alten Ägypten." In *Zwischen Magie und Wissenschaft: Ärzte und Heilkunst in den Papyri aus Ägypten*, edited by Harald Froschauer and Cornelia Römer, 43-54. Wien: Phoibos.
- . 2011. "Sāmānu on the Nile: The Transfer of a Near Eastern Demon and Magico-Medical Concept into New Kingdom Egypt." In *Ramesside Studies in Honour of K.A. Kitchen*, 189-98. Bolton: Rutherford Press.
- Foster, George M. 1976. "Disease Etiologies in Non-Western Medical Systems." *American Anthropologist* 78 (4): 773-82.

- Fox, Sherry C., and Kathryn Marklein. 2014. "Primary and Secondary Burials with Commingled Remains from Archaeological Contexts in Cyprus, Greece, and Turkey." In *Commingled and Disarticulated Human Remains*, edited by Anna J. Osterholtz, Kathryn M. Baustian, and Debra L. Martin, 193–211. Springer New York. http://link.springer.com/chapter/10.1007/978-1-4614-7560-6_11.
- France, Diane L. 1997. "Observational and Metric Analysis of Sex in the Skeleton." *Forensic osteology-Advances in the Identification of Human Remains*. Thomas, Springfield, Illinois, 163–86.
- Frandsen, P.J. 1990. "Editing Reality: The Turin Strike Papyrus." In *Studies in Egyptology Presented to Miriam Lichtheim*, edited by S. Israelit-Groll, 1:166–99. Jerusalem: Magnes Press.
- . 2007. "The Menstrual 'Taboo' in Ancient Egypt." *Journal of Near Eastern Studies* 66 (2): 81–106.
- Freidel, Klaus, Franz Petermann, Dagmar Reichel, Angela Steiner, Petra Warschburger, and Hans R. Weiss. 2002. "Quality of Life in Women with Idiopathic Scoliosis." *Spine* 27 (4): E87–E91.
- Gardiner, Alan H. 1917. "Professional Magicians in Ancient Egypt." *Proceedings of the Society of Biblical Archaeology* 39: 31–44.
- . 1931. *The Library of A. Chester Beatty; Description of a Hieratic Papyrus with a Mythological Story, Love-Songs, and Other Miscellaneous Texts*. London: Oxford University Press.
- . , ed. 1935. *Hieratic Papyri in the British Museum*. Vol. 1. Third Series Chester Beatty Gift. London: British Museum Press.
- . 1941. "Ramesside Texts Relating to the Taxation and Transport of Corn." *The Journal of Egyptian Archaeology* 27 (December): 19–73. doi:10.2307/3854559.
- . 1948. *Ramesside Administrative Documents*. London: Oxford University Press.
- . 1957. *Egyptian Grammar: Being an Introduction to the Study of Hieroglyphs*. London: Oxford University Press.
- Geeraerts, Dirk, and Stefan Grondelaers. 1995. "Looking Back at Anger: Cultural Traditions and Metaphorical Patterns." In *Language and the Cognitive Construal of the World*, edited by John R. Taylor and Robert E. MacLaury, 153–80. Trends in Linguistics Studies and Monographs 82. Berlin: Walter de Gruyter.
- Germer, Renate, Hartwig Altenmüller, and Fiona Elliott. 1997. *Mummies: Life After Death in Ancient Egypt*. Munich: Prestel Publishing.
- Ghalioungui, Paul. 1973. *The House of Life: Per Ankh. Magic and Medical Science in Ancient Egypt*. Amsterdam: B.M. Israël.

- . 1983. *The Physicians of Pharaonic Egypt*. Cairo: Al-Ahram Center for Scientific Translations.
- Gonzalez y Arema, Angel. 2004. "An Analysis of Various Anatomical Parts of Egyptian Mummies from Museum Collections in Spain." In *Egyptology at the Dawn of the Twenty-First Century*, edited by Zahi Hawass, 1:209–17. Cairo: American University in Cairo Press.
- Goodman, Alan H., and Jerome C. Rose. 1990. "Assessment of Systemic Physiological Perturbations from Dental Enamel Hypoplasias and Associated Histological Structures." *American Journal of Physical Anthropology* 33 (S11): 59–110. doi:10.1002/ajpa.1330330506.
- Goodman, Alan, D. Martin, and George Armelagos. 1984. "Indicators of Stress from Bones and Teeth." In *Paleopathology at the Origins of Agriculture*, edited by George J. Armelagos and Mark Nathan Cohen, 13–49. New York: Academic Press.
- Goodman, Alan, and Debra Martin. 2002. "Reconstructing Health Profiles from Skeletal Remains." In *The Backbone of History: Health and Nutrition in the Western Hemisphere*, edited by Richard H. Steckel and Jerome C. Rose, 11–60. Cambridge: Cambridge University Press.
- Gordon, Andrew. H, and Calvin W Schwabe. 2004. *The Quick and the Dead: Biomedical Theory in Ancient Egypt*. Leiden: Brill.
- Grapow, Hermann, Wolfhart Westendorf, and Hildegard von Deines. 1954. *Grundriss der Medizin der alten Ägypter*. 9 vols. Berlin: Akademie-Verlag.
- . 1958. *Grundriss der Medizin der alten Ägypter*. Vol. 5 Die medizinischen Texte in hieroglyphischer Umschreibung. Berlin: Akademie-Verlag.
- . 1959. *Grundriss der Medizin der alten Ägypter*. Vol. 6 Wörterbuch der ägyptischen Drogennamen. Berlin: Akademie-Verlag.
- . 1961. *Grundriss der Medizin der alten Ägypter*. Vol. 7, 1 and 2: Wörterbuch der medizinischen Texte. Berlin: Akademie-Verlag.
- Grauer, Anne L. 2008. "Macroscopic Analysis and Data Collection in Paleopathology." In *Advances in Human Palaeopathology*, edited by Ron Pinhasi and Simon Mays, 1st ed., 57–76. New York: John Wiley & Sons.
- Gray, P. H. K. 1972. "Notes Concerning the Position of Arms and Hands of Mummies with a View to Possible Dating of the Specimen." *The Journal of Egyptian Archaeology* 58 (August): 200–204. doi:10.2307/3856250.
- Green, M. 1976. "The Passing of Harmose." *Orientalia* 45: 395–409.
- Greulich, William Walter. 1951. "The Growth and Developmental Status of Guamanian School Children in 1947." *American Journal of Physical Anthropology* 9 (1): 55–70. doi:10.1002/ajpa.1330090105.

- Gunn, Battiscombe. 1955. "The Decree of Amonrasonthēr for Neskhons." *The Journal of Egyptian Archaeology* 41 (December): 83-105.
- Gutgesell, Manfred. 1983. *Die Datierung Der Ostraka Und Papyri Aus Deir El-Medineh Und Ihre Ökonomische Interpretation: Teil I: Die 20. Dynastie, Band I Und II*. Datierung Der Ostraka Und Papyri I. Hildesheim: Hildesheimer Ägyptologische Beiträge.
- . 2002. *Die Datierung Der Ostraka Und Papyri Aus Deir El-Medineh, Teil II: Die Ostraka Der 19. Dynastie*. Datierung Der Ostraka Und Papyri II. Hildesheim: Hildesheimer Ägyptologische Beiträge.
- Hafemann, Ingelore, Simon Schweitzer, Marianne Eaton-Krauss, and Stephan Seidlmayer. 2012. "Thesaurus Linguae Aegyptiae." <http://aaew.bbaw.de/tla/index.html>.
- Halioua, Bruno, Bernard Ziskind, and M. B. DeBevoise. 2005. *Medicine in the Days of the Pharaohs*. Cambridge: Belknap Press of Harvard University Press.
- Hall, Rosalind. 2001. *Egyptian Textiles*. Buckinghamshire: Shire Publications.
- Harris, James E., and Kent R. Weeks. 1973. *X-Raying the Pharaohs*. New York: Scribner.
- Hawass, Zahi, Yehia Z. Gad, Somaia Ismail, Rabab Khairat, Dina Fathalla, Naglaa Hasan, Amal Ahmed, et al. 2010. "Ancestry and Pathology in King Tutankhamun's Family." *JAMA* 303 (7): 638-47. doi:10.1001/jama.2010.121.
- Hawkey, D. E. 1998. "Disability, Compassion and the Skeletal Record: Using Musculoskeletal Stress Markers (MSM) to Construct an Osteobiography from Early New Mexico." *International Journal of Osteoarchaeology* 8 (5): 326-40.
- Helck, Wolfgang. 2002. *Die datierten und datierbaren Ostraka, Papyri und Graffiti von Deir el-Medineh*. Ägyptologische Abhandlungen 63. Wiesbaden: Otto Harrassowitz Verlag.
- Helman, Cecil. 2007. *Culture, Health and Illness*. 5th ed. Boca Raton: Taylor & Francis.
- Higgins, Rosanne L., Michael R. Haines, Lorena Walsh, and Joyce E. Sirianni. 2002. "The Poor in the Mid-Nineteenth-Century Northeastern United States." *The Backbone of History: Health and Nutrition in the Western Hemisphere*. Cambridge: Cambridge University Press. P, 162-84.
- Hooton, Earnest Albert, Habib Yusuf Rihan, and Edward Reynolds. 1930. *The Indians of Pecos Pueblo: A Study of Their Skeletal Remains*. Department of Archaeology, Phillips Academy, Andover, Mass.
- Hornung, Erik, Rolf Krauss, and David Warburton. 2006. *Ancient Egyptian Chronology*. Handbuch Der Orientalistik 83. Leiden: Brill.

- Hubert, Jane, ed. 2000. *Madness, Disability, and Social Exclusion: The Archaeology and Anthropology of "Difference."* One World Archaeology 40. London: Routledge.
- Hussien, Fawzia H., Rokia A. El Banna, and Azza M. Sarry El Din. 2006. "Non-Specific Stress Indicators in Ancient Egyptians from Giza and Bahriyah Oasis." *Journal of The Arab Society for Medical Research* 1 (1): 13-27.
- Hussien, Fawzia H., Soad Shabaan, Zahi Hawass, and Azza M. Sarry El Din. 2003. "Anthropological Differences between Workers and High Officials from the Old Kingdom at Giza." In *Egyptology at the Dawn of the Twenty-First Century*, edited by Zahi Hawass, 2:324-31. Cairo: American University in Cairo Press.
- Ikram, Salima, and Aidan Dodson. 1998. *The Mummy in Ancient Egypt: Equipping the Dead for Eternity*. New York: Thames & Hudson.
- James, Thomas Garnet Henry. 1970. *Hieroglyphic Texts from Egyptian Stelae Etc..* Vol. 9. London: Trustees of the British Museum.
- Janák, Jiří. 2013. "Akh." In *UCLA Encyclopedia of Egyptology*, edited by Willeke Wendrich and Jacco Dieleman. Los Angeles. <http://escholarship.org/uc/item/7255p86v>.
- Janot, F. 2003. "Inhumations D'enfants Au Nouvel Empire À Deir El-Medineh." *Momnonia. Bulletin Édité Par l'Association Pour La Sauvegarde Du Ramesseum* 14: 173-80.
- Janssen, Jac J. 1975. *Commodity Prices from the Ramessid Period: An Economic Study of the Village of Necropolis Workmen at Thebes*. Leiden: Brill.
- . 1980. "Absence from Work by the Necropolis Workmen of Thebes." *Studien Zur Altägyptischen Kultur* 8 (January): 127-52.
- . 1997. *Village Varia: Ten Studies on the History and Administration of Deir El-Medina*. Leiden: Nederlands Instituut voor het Nabije Oosten.
- Janssen, Jac J., and Pieter Willem Pestman. 1968. "Burial and Inheritance in the Community of the Necropolis Workmen At Thebes (P. Bulaq X and O. Petrie 16)." *Journal of the Economic and Social History of the Orient* 11: 137-70.
- Janssen, Rosalind. 1995. "Costume in New Kingdom Egypt." In *Civilizations of the Ancient Near East*, edited by Jack M. Sasson, 2255-64. New York: Scribner.
- . 1998. *Textiles*. Report on the Work of the University of Cambridge Theban Mission. <http://www.fitzmuseum.cam.ac.uk/tt99/report98/textile.html>.
- Jarcho, Saul. 1965. "Paleopathology." *Science* 147 (3662): 1160-63.
- Jonckheere, Frans. 1958. *Les Médecins de l'Égypte Pharaonique: Essai de Prosopographie*. Médecine Égyptienne 3. Bruxelles: Fondation égyptologique reine Élisabeth.

- Jones, Siân. 1997. *The Archaeology of Ethnicity*. Routledge.
- Joyce, Rosemary A. 2005. "Archaeology of the Body." *Annual Review of Anthropology* 34 (1): 139–58. doi:10.1146/annurev.anthro.33.070203.143729.
- Judd, Margaret A. 2008. "The Parry Problem." *Journal of Archaeological Science* 35 (6): 1658–66. doi:10.1016/j.jas.2007.11.005.
- Junge, Friedrich. 2005. *Late Egyptian Grammar: An Introduction*. 2nd English ed. Griffith Institute Publications. Oxford: Griffith Institute.
- Jurmain, Robert. 1999. *Stories from the Skeleton: Behavioral Reconstruction in Human Osteology*. Interpreting the Remains of the Past 1. London: Routledge.
- Kaptchuk, Ted J., Elizabeth Friedlander, John M. Kelley, M. Norma Sanchez, Efi Kokkotou, Joyce P. Singer, Magda Kowalczykowski, Franklin G. Miller, Irving Kirsch, and Anthony J. Lembo. 2010. "Placebos without Deception: A Randomized Controlled Trial in Irritable Bowel Syndrome." *PLoS ONE* 5 (12): e15591. doi:10.1371/journal.pone.0015591.
- Kaptchuk, Ted J., John M. Kelley, Lisa A. Conboy, Roger B. Davis, Catherine E. Kerr, Eric E. Jacobson, Irving Kirsch, et al. 2008. "Components of Placebo Effect: Randomised Controlled Trial in Patients with Irritable Bowel Syndrome." *BMJ* 336 (7651): 999–1003. doi:10.1136/bmj.39524.439618.25.
- Karl, Doris. 2000. "Funktion Und Bedeutung Einer Weisen Frau Im Alten Ägypten." *Studien Zur Altägyptischen Kultur* 28 (January): 131–60.
- Kaufman, M. H., D. Whitaker, and J. McTavish. 1997. "Differential Diagnosis of Holes in the Calvarium: Application of Modern Clinical Data to Palaeopathology." *Journal of Archaeological Science* 24 (3): 193–218. doi:10.1006/jasc.1995.0104.
- Kemp, Barry. 2012. *The City of Akhenaten and Nefertiti: Amarna and Its People*. London: Thames & Hudson.
- Kemp, Barry J., and Gillian Vogelsang-Eastwood. 2001. *The Ancient Textile Industry at Amarna*. Excavation Memoirs 68. London: Egypt Exploration Society.
- Kemp, Barry, Anna Stevens, Gretchen R. Dabbs, Melissa Zabecki, and Jerome C. Rose. 2013. "Life, Death and beyond in Akhenaten's Egypt: Excavating the South Tombs Cemetery at Amarna." *Antiquity* 87 (335).
- Kerley, Ellis R., and William M. Bass. 1967. "Paleopathology: Meeting Ground for Many Disciplines." *Science* 157 (3789): 638–44.
- Kimmerle, Erin H., and José Pablo Baraybar. 2008. *Skeletal Trauma*. Boca Raton: CRC Press.
- Kitchen, K. A. 1993. *Ramesside Inscriptions. Translated & Annotated*. 6 vols. Oxford: Wiley-Blackwell.

- Kitchen, K. A. 1969. *Ramesside Inscriptions*. 8 vols. Oxford: B. H. Blackwell.
- Kleinman, Arthur. 1981. *Patients and Healers in the Context of Culture: An Exploration of the Borderland Between Anthropology, Medicine, and Psychiatry*. Berkeley: University of California Press.
- Knudson, Kelly J., and Christopher M. Stojanowski. 2008. "New Directions in Bioarchaeology: Recent Contributions to the Study of Human Social Identities." *Journal of Archaeological Research* 16 (April): 397–432. doi:10.1007/s10814-008-9024-4.
- Koenig, Yvan. 1981. "Les Effrois de Keniherkhepeshef (Papyrus Deir El-Médineh 40)." *Revue d'Égyptologie Paris* 33: 29–37.
- . 1999. "Le Contre-Envoûtement de Ta-I-di-Imen. Pap. Deir El-Médineh 44." *Le Bulletin de l'Institut Français D'archéologie Orientale* 99: 259–81.
- Kolta, Kamal Sabri, and H. Tessenow. 2000. "Schmerzen, Schmerzstoffe oder Fäulnisprinzip Zur Bedeutung von whdw, einem zentralen Terminus der altägyptischen Medizin." *Zeitschrift für ägyptische Sprache und Altertumskunde* 127 (1): 38–52.
- "Lamisil." 2014. <http://www.lamisilat.com/>.
- Lang, Philippa. 2013. *Medicine and Society in Ptolemaic Egypt*. Leiden: Brill.
- Langensiepen, S., O. Semler, R. Sobottke, O. Fricke, J. Franklin, E. Schönau, and P. Eysel. 2013. "Measuring Procedures to Determine the Cobb Angle in Idiopathic Scoliosis: A Systematic Review." *European Spine Journal* 22 (11): 2360–71. doi:10.1007/s00586-013-2693-9.
- Larson, James S. 1999. "The Conceptualization of Health." *Medical Care Research and Review* 56 (2): 123–36. doi:10.1177/107755879905600201.
- Leake, Chauncey Depew. 1952. *The Old Egyptian Medical Papyri*. Lawrence: University of Kansas Press.
- Leitz, Christian. 1994. *Tagewählerei: Das Buch ḥ3t Nḥḥ Ph. Wy Dt Und Verwandte Texte*. Ägyptologische Abhandlungen 55. Wiesbaden: Otto Harrassowitz Verlag.
- Lesko, Barbara S. 1994. "Rank, Roles, and Rights." In *Pharaoh's Workers: The Villagers of Deir El Medina*, edited by Leonard Lesko, 15–40. Ithaca: Cornell University Press.
- Lesko, Leonard H, and Barbara S Lesko. 1982. *A Dictionary of Late Egyptian*. Vol. I–V. Berkeley: B.C. Scribe Publications.
- Leslie, Kieron S., and Nick J. Levell. 2006. "Skin Disease in Mummies." *International Journal of Dermatology* 45 (2): 161–63.

- Letellier, Bernadette. 1980. "La Destinée de Deux Enfants, Un Ostracon Ramesside Inédit." In *IFAO Livre Du Centenaire, 1880-1980*, edited by Jean Vercoutter, 127-33. Mémoires Publiés Par Les Membres de l'Institut Français D'archéologie Orientale Du Caire 104. Cairo: Institut français d'archéologie orientale.
- Lichtheim, Miriam. 1976. *Ancient Egyptian Literature: The Old and Middle Kingdoms*. Vol. 1. Berkeley: University of California Press.
- Lovejoy, C. Owen, and Kingsbury G. Heiple. 1981. "The Analysis of Fractures in Skeletal Populations with an Example from the Libben Site, Ottawa County, Ohio." *American Journal of Physical Anthropology* 55 (4): 529-41.
- Lovejoy, C. Owen, Richard S. Meindl, Thomas R. Pryzbeck, and Robert P. Mensforth. 1985. "Chronological Metamorphosis of the Auricular Surface of the Ilium: A New Method for the Determination of Adult Skeletal Age at Death." *American Journal of Physical Anthropology* 68 (1): 15-28.
- Lovell, Nancy C. 2000. "Paleopathological Description and Diagnosis." In *Biological Anthropology of the Human Skeleton*, 217-48. New York: Wiley-Liss.
- . 2008. "Analysis and Interpretation of Skeletal Trauma." In *Biological Anthropology of the Human Skeleton*, edited by Mary Anne Katzenberg and Shelley Rae Saunders, 2nd ed., 341-86. Hoboken: Wiley-Liss.
<http://onlinelibrary.wiley.com/doi/10.1002/9780470245842.ch11/summary>.
- Lucarelli, Rita. 2009. "Beliefs in Demons in the Libyan Period: Evidence of the Oracular Amuletic Decrees." In *The Libyan Period in Egypt*, edited by G.P.F. Broekman, R.J. Demarée, and Olaf E. Kaper, 231-39. Leiden: Nederlands Instituut voor het Nabije Oosten.
- . 2010. "Demons (benevolent and Malevolent)." In *UCLA Encyclopedia of Egyptology*, edited by Willeke Wendrich and Jacco Dieleman. Los Angeles.
<http://digital2.library.ucla.edu/viewItem.do?ark=21198/zz0025fks3>.
- Mandeville, Richard. 2010. "Wage Accounting in Deir El-Medina". Ph.D., University of Liverpool.
- Mann, Robert W, and David R Hunt. 2013. *Photographic Regional Atlas of Bone Disease: A Guide to Pathologic and Normal Variation in the Human Skeleton*. Springfield: Charles C. Thomas.
- Maresh, Marion. 1955. "Linear Growth of Long Bones of Extremities from Infancy through Adolescence: Continuing Studies." *A.M.A. American Journal of Diseases of Children* 89 (6): 725-42. doi:10.1001/archpedi.1955.02050110865010.
- Maspero, Gaston. 1893. *Études de Mythologie et D'archéologie Égyptiennes*. Paris: Leroux.

- Mathieu, Bernard. 1993. "Sur Quelques Ostraca Hiératiques Littéraires Récemment Publiés." *Bulletin de l'Institut Français d'Archéologie Orientale Du Caire*, no. 93: 335-48.
- McDowell, A. G. 1998. "Legal Aspects of Care of the Elderly in Egypt to the End of the New Kingdom." In *The Care of the Elderly in the Ancient Near East*, edited by Marten Stol and S. P. Vleeming, 199-221. Studies in the History and Culture of the Ancient Near East 14. Leiden: Brill.
- . 1999. *Village Life in Ancient Egypt: Laundry Lists and Love Songs*. New York: Oxford University Press.
- McElroy, Ann, and Patricia K. Townsend. 2008. *Medical Anthropology in Ecological Perspective*. Boulder: Westview Press.
- Meindl, Richard S., and C. Owen Lovejoy. 1985. "Ectocranial Suture Closure: A Revised Method for the Determination of Skeletal Age at Death Based on the Lateral-Anterior Sutures." *American Journal of Physical Anthropology* 68 (1): 57-66.
- Merbs, C. F. 1989. "Trauma." In *Reconstruction of Life from the Skeleton*, edited by Mehmet Yasar Iscan and Kenneth AR Kennedy, 161-89. New York: Liss.
- Meskell, Lynn. 1999. *Archaeologies of Social Life*. Wiley-Blackwell.
- . 2007. "Archaeologies of Identity." In *The Archaeology of Identities: A Reader*, 23-43. New York: Routledge.
- Miller, Judith. 2008. *An Appraisal of the Skulls and Dentition of Ancient Egyptians, Highlighting the Pathology and Speculating on the Influence of Diet and Environment*. Oxford: British Archaeological Reports.
- Miller, R L. 1991. "Palaeoepidemiology, Literacy, and Medical Tradition among Necropolis Workmen in New Kingdom Egypt." *Medical History* 35 (1): 1-24.
- Möller, Georg. 1909. *Hieratische Paläographie: die aegyptische Buchschrift in ihrer Entwicklung von der fünften Dynastie bis zur römischen Kaiserzeit*. Leipzig: J. C. Hinrich.
- Molleson, Theya. 2007. "A Method for the Study of Activity Related Skeletal Morphologies." *Bioarchaeology of the Near East* 1: 5-33.
- Moraitis, Pr Konstantinos, and Chara Spiliopoulou. 2006. "Identification and Differential Diagnosis of Perimortem Blunt Force Trauma in Tubular Long Bones." *Forensic Science, Medicine, and Pathology* 2 (4): 221-29. doi:10.1385/FSMP:2:4:221.
- Moss, Gordon Ervin. 1973. *Illness, Immunity, and Social Interaction: The Dynamics of Biosocial Resonance*. New York: Wiley.

- Nagel, Georges. 1938. *La céramique du Nouvel Empire à Deir el Médineh*. Documents de fouilles 10. Cairo: Institut français d'archéologie orientale.
- National Science and Technology Council. 2009. "Social, Behavioral and Economic Research in the Federal Context." [http://www.whitehouse.gov/files/documents/ostp/NSTC%20Reports/SBE%20in%20the%20Federal%20Context%20\(for%20NSTC\)%204-21-09.pdf](http://www.whitehouse.gov/files/documents/ostp/NSTC%20Reports/SBE%20in%20the%20Federal%20Context%20(for%20NSTC)%204-21-09.pdf).
- Nerlich, A., A. Zink, H. G. Hagedorn, U. Szeimies, and C. Weyss. 2000. "Anthropological and Palaeopathological Analysis of the Human Remains from Three 'Tombs of the Nobles' of the Necropolis of Thebes-West, Upper Egypt." *Anthropologischer Anzeiger* 58 (4): 321-43.
- Nicholson, Paul T., and Ian Shaw. 2000. *Ancient Egyptian Materials and Technology*. Cambridge: Cambridge University Press.
- Nunn, J. F. 1996. *Ancient Egyptian Medicine*. Norman: University of Oklahoma Press.
- Olivieri, Ignazio, Salvatore D'Angelo, Carlo Palazzi, Angela Padula, Reuven Mader, and Muhammad A. Khan. 2009. "Diffuse Idiopathic Skeletal Hyperostosis: Differentiation from Ankylosing Spondylitis." *Current Rheumatology Reports* 11 (5): 321-28. doi:10.1007/s11926-009-0046-9.
- Ortner, Donald J. 2003. *Identification of Pathological Conditions in Human Skeletal Remains*. 2nd ed. San Diego: Academic Press.
- . 2011. "Differential Diagnosis and Issues in Disease Classification." In *A Companion to Paleopathology*, edited by Anne L. Grauer, 250-67. Chichester: Wiley-Blackwell.
- Pechníková, Markéta, Davide Porta, and Cristina Cattaneo. 2011. "Distinguishing between Perimortem and Postmortem Fractures: Are Osteons of Any Help?" *International Journal of Legal Medicine* 125 (4): 591-95.
- Peck, William. 1998. "Mummies of Ancient Egypt." In *Mummies, Disease and Ancient Cultures*, edited by Thomas Aidan Cockburn, Eve Cockburn, and Theodore A. Reyman, 2nd ed., 15-37. Cambridge: Cambridge University Press.
- Peust, Carsten. 1996. *Indirekte Rede im Neuägyptischen*. Göttinger Orientforschungen IV. Ägypten 33. Wiesbaden: Harrassowitz Verlag.
- Pierrat-Bonnefois, G. 2003. "Cimetière Est Du Village Ou Cimetière À L'est de Deir El-Médineh?" In *Deir El-Médineh et La Vallée Des Rois. Actes Du Colloque Organisé Par Le Musée Du Louvre Les 3 et 4 Mai 2002*, edited by Guillemette Andreu, 49-65. Paris: Musée du Louvre.
- Pinch, Geraldine. 1983. "Childbirth and Female Figurines at Deir El-Medina and El-Amarna." *Orientalia Roma* 52 (3): 405-14.
- . 1995. *Magic in Ancient Egypt*. Austin: University of Texas Press.

- Pinhasi, Ron, and Simon Mays. 2008. *Advances in Human Palaeopathology*. Chichester, England: John Wiley & Sons.
- Porter, Roy. 1998. *The Greatest Benefit to Mankind: A Medical History of Humanity*. New York: W. W. Norton & Company.
- Quack, Joachim Friedrich. 2003. "Methoden Und Möglichkeiten Der Erforschung Der Medizin Im Alten Ägypten." *Medizinhistorisches Journal* 38: 3-15.
- . 2011. "Beiträge Zu Einigen Religiösen Und Magischen Texte." In *Ramesside Studies in Honour of K.A. Kitchen*, edited by Mark Collier and Steven Snape, 413-16. Bolton: Rutherford Press.
- Quirke, Stephen, and A. Jeffrey Spencer. 1992. *The British Museum Book of Ancient Egypt*. London: British Museum Press.
- Raxter, Michelle H. 2011. "Egyptian Body Size A Regional and Worldwide Comparison". Ph.D., Tampa: University of South Florida.
- Raxter, Michelle H., Christopher B. Ruff, Ayman Azab, Moushira Erfan, Muhammad Soliman, and Aly El-Sawaf. 2008. "Stature Estimation in Ancient Egyptians: A New Technique Based on Anatomical Reconstruction of Stature." *American Journal of Physical Anthropology* 136 (2): 147-55. doi:10.1002/ajpa.20790.
- Reisner, George Andrew. 1905. *The Hearst Medical Papyrus: Hieratic Text in 17 Facsimile Plates in Collotype, with Introduction and Vocabulary*. Leipzig: J.C. Hinrichs.
- Resnick, Donald. 1996. *Bone and Joint Imaging*. 2nd ed. Philadelphia: Elsevier Saunders.
- Riefstahl, Elizabeth. 1944. *Patterned Textiles in Pharaonic Egypt*. Brooklyn: Brooklyn Museum.
- Ritner, Robert K. 2000. "Innovations and Adaptations in Ancient Egyptian Medicine." *Journal of Near Eastern Studies* 59 (2): 107-17. doi:10.2307/545610.
- . 2008. *The Mechanics of Ancient Egyptian Magical Practice*. Chicago: Oriental Institute of the University of Chicago.
- Roberts, C. A., and B. Connell. 2004. "Guidance on Recording Palaeopathology." In *Guidelines to the Standards for Recording Human Remains*, edited by Megan Brickley and Jacqueline I. McKinley, 34-40. IFA Paper 7. Southampton: BBAO, Department of Archaeology, University of Southampton.
- Rogers, Juliet, and Tony Waldron. 1995. *A Field Guide to Joint Disease in Archaeology*. Chichester: Wiley.

- Rose, Jerome C., SC Anton, Arthur C. Aufderheide, L. E Eisenberg, J.B. Gregg, E.J. Neiburger, and Bruce M. Rothschild. 1991. *Skeletal Database Committee Recommendations*. Detroit, MI: Paleopathology Association.
- Rose, Jerome C., Teri L. Tucker, Nancy C. Lovell, Joyce Filer, and British Museum. 1996. *Bioarchaeology of Ancient Egypt and Nubia: A Bibliography*. British Museum.
- Rose, Jerome C., and Peter S. Ungar. 1998. "Gross Dental Wear and Dental Microwear in Historical Perspective." In *Dental Anthropology: Fundamentals, Limits, Prospects*, edited by K.W. Alt, F.W. Rösing, and M. Teschler-Nicola, 349-86. Stuttgart: Gustav Fischer.
- Rose, Jerome C., and Melissa Zabecki. 2009. "The Commoners of Tell El-Amarna." In *Beyond the Horizon: Studies in Egyptian Art, Archaeology and History in Honour of Barry J. Kemp*, edited by Salima Ikram and Aidan Dodson, 408-22. Cairo: Publications of the Supreme Council of Antiquities.
- Rosenow, D. C. E. 2008. "Es Stinkt - Hygiene Im Alten Ägypten." In *Marburger Treffen Zur Altägyptischen Medizin: Vorträge Und Ergebnisse 2002-2007*, edited by Rainer Hannig, 35-46. Göttingen: Universität Göttingen.
- Roveri, Anna Maria Donadoni. 2001. *The Art of Weaving*. Turin: Electa.
- Sabbahy, Lisa. 2010. "The People of Deir El-Medineh: A Preliminary Paleopathology Study." *Anthropologie* 48 (2): 117-20.
- . 2012. *Paleopathology of the Ancient Egyptians: Annotated Bibliography: 1998-2011*. Cairo: American University in Cairo Press.
- Sadek, Ashraf I. 1987. *Popular Religion in Egypt during the New Kingdom*. Hildesheim: Gerstenberg.
- Sakaue, Kazuhiro. 2004. "Sexual Determination of Long Bones in Recent Japanese." *Anthropological Science: Journal of the Anthropological Society of Nippon* 112 (1): 75-81.
- Sanchez, Gonzalo M., and Edmund S. Meltzer. 2012. *The Edwin Smith Papyrus: Updated Translation of the Trauma Treatise and Modern Medical Commentaries*. Atlanta: Lockwood Press.
- Sandwith, Fleming Mant. 1905. *The Medical Diseases of Egypt*. London: Kimpton.
- Sauneron, Serge. 1957. *Les prêtres de l'ancienne Egypte*. Paris: Editions du Seuil.
- . 1970. "Le Rhume d'Anynakhte (Pap. Deir El-Medineh 36)." *Kemi* 20: 7-18.
- Scheidel, Walter. 2001. *Death on the Nile: Disease and the Demography of Roman Egypt*. Leiden: Brill.

- Scheuer, Louise, and Sue M. Black. 2004. *The Juvenile Skeleton*. London: Elsevier Academic Press.
- Schneider, Thomas. 2000. "Die Waffe Der Analogie. Altägyptische Magie Als System." In *Das Analogiedenken*, edited by M. Bachmann and K Gloy, 37-85. Freiburg/München: Alber.
- . 2010. "UEE Chronology." *Encyclopedia of Egyptology*. <http://www.uee.ucla.edu/contributors/chronology.htm>.
- Schrader, Sarah A. 2012. "Activity Patterns in New Kingdom Nubia: An Examination of Enteseal Remodeling and Osteoarthritis at Tombos." *American Journal of Physical Anthropology* 149 (1): 60-70. doi:10.1002/ajpa.22094.
- Selye, Hans. 1956. *The Stress of Life*. New York: McGraw-Hill.
- Shakespeare, Tom. 1999. "Commentary: Observations on Disability and Archaeology." In *Disability and Archaeology*, edited by Nyree Finlay, 98-101. Archaeological Review 15.2. Cambridge: University of Cambridge.
- Smith, B. Holly. 1984. "Patterns of Molar Wear in Hunter-gatherers and Agriculturalists." *American Journal of Physical Anthropology* 63 (1): 39-56.
- Smith, Stuart Tyson. 2003. *Wretched Kush: Ethnic Identities and Boundaries in Egypt's Nubian Empire*. London; New York: Routledge.
- Snape, Steven. 2011. "Senedjem: Building and Buying at Deir El-Medina." In *Ancient Egyptian Tombs: The Culture of Life and Death*, 233-44. Chichester: Wiley-Blackwell.
- Snyder, Robert B., A. Brant Lipscomb, and Robert K. Johnston. 1981. "The Relationship of Tarsal Coalitions to Ankle Sprains in Athletes." *The American Journal of Sports Medicine* 9 (5): 313-17. doi:10.1177/036354658100900505.
- Sobo, Elisa Janine, and Martha O. Loustaunau. 2010. *The Cultural Context of Health, Illness, and Medicine*. 2nd ed. Santa Barbara: Praeger.
- Sofaer, Joanna R. 2006. *The Body as Material Culture: A Theoretical Osteoarchaeology*. Cambridge: Cambridge University Press.
- Sørensen, J. P. 1984. "The Argument in Ancient Egyptian Magical Formulae." *Acta Orientalia Kobenhavn* 45: 5-19.
- Spradley, James P., and Mark Phillips. 1972. "Culture and Stress: A Quantitative Analysis." *American Anthropologist* 74 (3): 518-29. doi:10.1525/aa.1972.74.3.02a00190.
- Spradley, M. Katherine, and Richard L. Jantz. 2011. "Sex Estimation in Forensic Anthropology: Skull Versus Postcranial Elements." *Journal of Forensic Sciences* 56 (2): 289-96. doi:10.1111/j.1556-4029.2010.01635.x.

- Steckel, R. H., C. S. Larsen, P. W. Sciulli, and P. I. Walker. 2006. *Global History of Health Data Collection Codebook [Internet]*. Columbus: Ohio State University. http://global.sbs.ohiostate.edu/new_docs/Codebook_05_17_06.pdf.
- Steckel, Richard H. 2003. "Research Project: A History of Health in Europe from the Late Paleolithic Era to the Present." *Economics & Human Biology* 1 (1): 139–42. doi:10.1016/S1570-677X(02)00003-5.
- Steckel, Richard H., Paul W. Sciulli, and Jerome C. Rose. 2002. "A Health Index from Skeletal Remains." In *The Backbone of History: Health and Nutrition in the Western Hemisphere*, edited by Richard H. Steckel and Jerome C. Rose, 61–93. New York: Cambridge University Press.
- Steckel, Richard, and Jerome C. Rose, eds. 2002. *The Backbone of History: Health and Nutrition in the Western Hemisphere*. New York: Cambridge University Press.
- Steuer, Robert Otto, and John Bertrand de Cusance Morant Saunders. 1959. *Ancient Egyptian & Cnidian Medicine: The Relationship of Their Aetiological Concepts of Disease*. Berkeley: University of California Press.
- Steyn, Maryna, and M. Yaşar İşcan. 1997. "Sex Determination from the Femur and Tibia in South African Whites." *Forensic Science International* 90 (1): 111–19.
- Stinson, Sara. 1985. "Sex Differences in Environmental Sensitivity during Growth and Development." *American Journal of Physical Anthropology* 28 (S6): 123–47. doi:10.1002/ajpa.1330280507.
- Strouhal, Eugen, and Luboš Vyhnánek. 1979. *Egyptian Mummies in Czechoslovak Collections*. Praha: Národní Muzeum : Náprstkovo Muzeum.
- Stuart-Macadam, P. 1987. "Porotic Hyperostosis: New Evidence to Support the Anemia Theory." *American Journal of Physical Anthropology* 74 (4): 521–26. doi:10.1002/ajpa.1330740410.
- Stuart-Macadam, Patty. 1992. "Porotic Hyperostosis: A New Perspective." *American Journal of Physical Anthropology* 87 (1): 39–47. doi:10.1002/ajpa.1330870105.
- Stuhr, Marko. 2011. "Egyptian Medical Texts." *Medizinische Schriften Der Alten Ägypter*. <http://www.medizinische-papyri.de/>.
- Sweeney, Deborah. 2006. "Women Growing Older at Deir El-Medina." In *Living and Writing in Deir El-Medine: Socio-Historical Embodiment of Deir El-Medine Texts*, edited by Andreas Dorn and Tobias Hofmann, 135–54. Basel: Schwabe.
- . 2014. "Women's Correspondence from Deir El-Medineh." In *Acts of the Sixth International Conference of Egyptology*, 2:523–29. Sesto Congresso Internazionale Di Egittologia. Atti. Accessed May 13.

- Sweeney, Edward A., Jorge Cabrera, Juan Urrutia, and Leonardo Mata. 1969. "Factors Associated with Linear Hypoplasia of Human Deciduous Incisors." *Journal of Dental Research* 48 (6): 1275-79.
- Tata, Giovanni. 1986. "The Development of the Egyptian Textile Industry (neolithic, Dynastic, Egypt)". Ph.D., Salt Lake City: The University of Utah.
- Taylor, John H. 1996. *Unwrapping a Mummy: The Life, Death and Embalming of Horemkenesi*. London: British Museum.
- Thompson, Herbert. 1941. "Two Demotic Self-Dedications." *The Journal of Egyptian Archaeology* 26 (February): 68. doi:10.2307/3854523.
- Tilley, Lorna, and Tony Cameron. 2014. "Introducing the Index of Care: A Web-Based Application Supporting Archaeological Research into Health-Related Care." *International Journal of Paleopathology* 6 (September): 5-9. doi:10.1016/j.ijpp.2014.01.003.
- Tilley, Lorna, and Marc F. Oxenham. 2011. "Survival against the Odds: Modeling the Social Implications of Care Provision to Seriously Disabled Individuals." *International Journal of Paleopathology* 1 (1): 35-42. doi:10.1016/j.ijpp.2011.02.003.
- Todd, T. W. 1921. "Age Changes in the Pubic Bone. I: The Male White Pubis." *American Journal of Physical Anthropology*, no. 3: 285-334.
- Toivari-Viitala, Jaana. 2001. *Women at Deir El-Medina: A Study of the Status and Roles of the Female Inhabitants in the Workmen's Community during the Ramesside Period*. Leiden: Nederlands Instituut Voor Het Nabije Oosten.
- . 2006. "Absence from Work at Deir El-Medina." In *Living and Writing in Deir El-Medine: Socio-Historical Embodiment of Deir El-Medine Texts*, edited by Andreas Dorn and Tobias Hofmann, 155-59. Basel: Schwabe.
- Ubelaker, Douglas H. 1989. "The Estimation of Age at Death from Immature Human Bone." In *Age Markers in the Human Skeleton*, edited by Mehmet Yasar Iscan, 55-70. Springfield: Charles C. Thomas.
- Valbelle, Dominique. 1985. *Les ouvriers de la Tombe*. Bibliothèque d'Étude 96. Cairo: Institut français d'archéologie orientale du Caire.
- Vandier, Jacques. 1966. "Iousâas et (Hathor)-Nébet-Hétépet." *Revue d'Égyptologie* 18: 67-142.
- Venmans, A., C. A. Klazen, P. N. M. Lohle, W. P. Mali, and W. J. van Rooij. 2012. "Natural History of Pain in Patients with Conservatively Treated Osteoporotic Vertebral Compression Fractures: Results from VERTOS II." *American Journal of Neuroradiology* 33 (3): 519-21. doi:10.3174/ajnr.A2817.

- Vogelsang-Eastwood, Gillian. 1990. "The Textiles from Quseir Al-Qadim, Egypt." *Oudheidkundige Mededelingen van Het Rijksmuseum Te Leiden. Supplement 70*: 195-200.
- . 1992. *The Production of Linen in Pharaonic Egypt*. Leiden: Textile Research Centre.
- . 2000. "Textiles." In *Ancient Egyptian Materials and Technology*, edited by Paul T. Nicholson and Ian Shaw, 268-98. Cambridge: Cambridge University Press.
- Waldron, Tony. 2008. *Palaeopathology*. Cambridge: Cambridge University Press.
- Walker, James H. 1996. *Studies in Ancient Egyptian Anatomical Terminology*. Warminster: Aris and Phillips.
- Walker, P. L., R. R. Bathurst, R. Richman, T. Gjerdrum, and V. A. Andrushko. 2009. "The Causes of Porotic Hyperostosis and Cribra Orbitalia: A Reappraisal of the Iron-Deficiency-Anemia Hypothesis." *American Journal of Physical Anthropology* 139 (2): 109-25.
- Walker, Phillip L., Gregory Dean, and Perry Shapiro. 1991. "Estimating Age from Tooth Wear in Archaeological Populations." In *Advances in Dental Anthropology*, 169-78. New York: Wiley-Liss.
- Waters-Rist, Andrea, Vladimir I. Bazaliiskii, Andrzej Weber, Olga I. Goriunova, and M. Anne Katzenberg. 2010. "Activity-Induced Dental Modification in Holocene Siberian Hunter-Fisher-Gatherers." *American Journal of Physical Anthropology* 143 (2): 266-78. doi:10.1002/ajpa.21313.
- Weinstein, Stuart L., Lori A. Dolan, Kevin F. Spratt, Kirk K. Peterson, Mark J. Spoonamore, and Ignacio V. Ponseti. 2003. "Health and Function of Patients with Untreated Idiopathic Scoliosis: A 50-Year Natural History Study." *JAMA: The Journal of the American Medical Association* 289 (5): 559-67.
- Weiss, Paul A., Arthur Koestler, and John R. Smythies. 1969. "The Living System: Determinism Stratified." In *Beyond Reductionism: New Perspectives in the Life Sciences*, 3-55. London: Hutchinson.
- Weissman, Barbara N. W., ed. 2009. *Imaging of Arthritis and Metabolic Bone Disease: Expert Consult - Online and Print, 1e*. 1 Har/Psc edition. Philadelphia, PA: Mosby.
- Wendrich, Willeke. 2006. "Entangled, Connected or Protected? The Power of Knots and Knotting in Ancient Egypt." In *Through a Glass Darkly: Magic, Dreams and Prophecy in Ancient Egypt*, edited by Kasia Maria Szpakowska, 243-69. Swansea: Classical Press of Wales.
- Wente, Edward F. 1961. "A Letter of Complaint to the Vizier to." *Journal of Near Eastern Studies* 20 (4): 252-57.
- . 1967. *Late Ramesside Letters*. Chicago: University of Chicago Press.

- . 1990. *Letters from Ancient Egypt*. Edited by Edmund S. Meltzer. Atlanta: Scholars Press.
- . 1996. "A Goat for an Ailing Woman (Ostrakon Wenté)." In *Studies in Honor of William Kelly Simpson*, 2:855–67. Boston: Boston Museum of Fine Arts.
- Westendorf, Wolfhart. 1961. "Grammatik der medizinischen Texte". Berlin: [s.n.].
- . 1998. *Handbuch Der Altägyptischen Medizin*. 2 vols. Handbook of Oriental Studies Ancient Near East 36. Leiden: Brill.
- White, Donald J. 1997. "Dental Calculus: Recent Insights into Occurrence, Formation, Prevention, Removal and Oral Health Effects of Supragingival and Subgingival Deposits." *European Journal of Oral Sciences* 105 (5): 508–22. doi:10.1111/j.1600-0722.1997.tb00238.x.
- White, Peter, ed. 2005. *Biopsychosocial Medicine: An Integrated Approach to Understanding Illness*. Oxford: Oxford University Press.
- Wilfong, Terry. 1999. "Menstrual Synchrony and the 'Place of Women' in Ancient Egypt (OIM 13512)." In *Gold of Praise. Studies on Ancient Egypt in Honor of Edward F. Wenté*, edited by Edward F. Wenté, Emily Teeter, and John A. Larson, 419–34. *Studies in Ancient Oriental Civilization* 58. Chicago: Oriental Institute of the University of Chicago.
- . 2013. "The Oracular Amuletic Decrees: A Question of Length." *Journal of Egyptian Archaeology* 99: 295–99.
- Wilper, Andrew P., Steffie Woolhandler, Karen E. Lasser, Danny McCormick, David H. Bor, and David U. Himmelstein. 2009. "Health Insurance and Mortality in US Adults." *American Journal of Public Health* 99 (12): 2289–95.
- Winlock, H. E. 1926. "The Museum's Excavations at Thebes." *The Metropolitan Museum of Art Bulletin* 21 (3): 5–32. doi:10.2307/3254817.
- Wisseman, Sarah U. 2003. *The Virtual Mummy*. Urbana: University of Illinois Press.
- Wolff, Harold G. 1953. *Stress and Disease*. American Lecture Series 166. Springfield: Thomas.
- World Health Organization. 1948. "Preamble to the Constitution of the World Health Organization as Adopted by the International Health Conference." In New York: 19 June - 22 July 1946; signed on 22 July 1946 by the representatives of 61 States (Official Records of the World Health Organization, no. 2, p. 100) and entered into force on 7 April 1948.
- . 2012. "International Classification of Functioning, Disability and Health (ICF)." <http://www.who.int/classifications/icf/en/>.

- Wyatt, H.V. 1993. "Poliomyelitis." In *The Cambridge World History of Human Disease*, edited by Kenneth F. Kiple, 942-50. New York: Cambridge University Press.
- Wylie, Alison. 2002. *Thinking from Things: Essays in the Philosophy of Archaeology*. University of California Press.
- Young, Allan. 1982. "The Anthropologies of Illness and Sickness." *Annual Review of Anthropology*, 257-85.
- Yoyotte, Jean. 1968. "Une Théorie Étiologique Des Médecins Égyptiens." *Kemi* 18: 79-84.
- Zabecki, M., and J. Rose. 2010. "South Tombs Cemetery 2010: Bioarchaeology Report." <http://amarnaproject.com/documents/pdf/STC-2010-bioarchaeology-revised.pdf>.
- Zaki, M. E., F. H. Hussien, and R. Abd El-Shafy El Banna. 2009. "Osteoporosis among Ancient Egyptians." *International Journal of Osteoarchaeology* 19 (1): 78-89. doi:10.1002/oa.978.
- Zakrzewski, Sonia R. 2003. "Variation in Ancient Egyptian Stature and Body Proportions." *American Journal of Physical Anthropology* 121 (3): 219-29. doi:10.1002/ajpa.10223.
- "ZICAM®." 2014. <http://www.zicam.com/>.
- Zimmerman, Michael R. 1986. "Mummification Styles as a Guide to the Dating of Egyptian Mummies." In *Dating and Age Determination of Biological Materials*, edited by Michael R. Zimmerman and J. Lawrence Angel, 166-69. London: Croom Helm.
- Zink, A, U Reischl, H Wolf, A G Nerlich, and R Miller. 2001. "Corynebacterium in Ancient Egypt." *Medical History* 45 (2): 267-72.
- Zink, A., C. J Haas, U. Reischl, U. Szeimies, and A. G Nerlich. 2001. "Molecular Analysis of Skeletal Tuberculosis in an Ancient Egyptian Population." *Journal of Medical Microbiology* 50 (4): 355.
- Zink, A. R, C. Sola, U. Reischl, W. Grabner, N. Rastogi, H. Wolf, and A. G Nerlich. 2003. "Characterization of Mycobacterium Tuberculosis Complex DNAs from Egyptian Mummies by Spoligotyping." *Journal of Clinical Microbiology* 41 (1): 359.