Accidents, Injuries, and Illness in the Ancient City: Lessons for World Health Today

2018

Overview

This module contains nine short, illustrated case narratives about accidents, injuries, and occupational illnesses based on archaeological evidence from urban antiquity. These stories are designed to invite discussion about global health in classes in the humanities, especially history, classics, anthropology, and/or art and material culture. Each story features a picture or graphic, a brief summary of the health condition or risk illustrated, historical context, and a paragraph suggesting how such health conditions and risks may relate to world health today. The discussion questions below may be used in the classroom to invite student reflection on these stories, either individually or as a module.

The health conditions and risks in these stories relate to the following topics: economic inequities in urban population density (injury, accidents), urban poverty, malnutrition, workplace and housing conditions, child health, and the consequences of war, conflict, and refugee displacement. Through these stories, students may gain an appreciation for the multidisciplinary nature of world health, and how learning from the past can shape how we talk about risks, challenges, and opportunities for health today.

Each of the nine cases in this module includes a thumbnail image representing the social and health conditions of a person or persons from the past; a summary of the condition illustrated; source citations and links for teachers to view original images in digital publications and online; a brief statement about the modern relevance of each case for health risks and responses in world health today; and questions for further discussion.

Learner Level

High School, Undergraduate

A Note on the Images:

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Teaching Material

This module contains the following nine illustrated stories:

1. Ancient Egypt: Working for Pharaoh at Tell El-Amarna
2. Back-breaking Work
3. The Short-legged Child
4. Public Violence for Entertainment
5. Child Labor Under the Volcano
6. Teething Rings: Survival and Stressors in Medieval London
7. Burying Babies
8. Broken Ribs in a Roman Army Camp
9. Nakht, the Teenage Weaver

Learning Objectives

In this module, the student will:

- Learn that living in an urban and urbanizing setting may be associated with particular health risks related to injury, trauma, and ill health.
- Be able to identify specific “social determinants” (factors in living conditions) that contribute to health risks in urbanization [for example: housing conditions, increased population density and the accident and communicable disease risks of crowding (e.g., epidemics such as plague); employment and workplace injuries; and conditions of air, food, and water].
- Consider the role of economic poverty in urban health risks (class and other social distinctions).
- Consider and discuss these topics in the context of particular individuals who lived in the ancient world, whose bodies illustrate examples from archaeology.
- Reflect on how such urban risks from the past might inform the way we understand the present.
- Be asked to structure their thinking and discussion into a global health framework that considers one or more of the following:
  - Context: biology, population, social organization, and environment
  - Health problems: conditions and determinants
  - Possible responses: Health systems and health policies; non-health approaches, such as government policies, laws, prevailing traditional or religious efforts, entrepreneurship, and action from the private sector

Classroom Discussion Guidelines

Each case includes discussion pointers related to that particular narrative. Below are suggestions to inspire general discussion on all the stories, inviting students to consider common themes across the series.

Solve the Mystery!

Each of these images is an unsolved mystery about a real person (or persons). The teacher may begin by showing the images without the explanation. Ask students to guess what is wrong: what is the health condition suggested here? Use hints to point to details in the photo or chart. Selectively tell students some of the story details to help suggest possible answers. Invite students to make up and tell one another a story about how they imagine the circumstance in each case. The full details of the case can then be provided at or near the end of the session. This wrap-up ensures that the class understands the broad range of social
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circumstances that can be involved in the cause and suffering of these conditions and how they relate to life and work in a city.

Discussion Questions

1. What is wrong with this picture (or chart)? What do you see and what does it suggest to you about this person's health?
2. Do you see an injury or an illness here? If this condition is related to an injury, do you think it was an unintentional accident? Or something that was deliberate? What kind of circumstance would cause this health problem?
3. Based on what you see or what you think you know about this story, would you say that the victim probably died from this problem? Why or why not?
4. If you think they survived (hint: scars on bones suggest the person survived), imagine what it might have been like to live—for months or years afterwards—with the consequences of these conditions. How do you think living with these conditions affected quality of life?
5. Most of these individuals were living and working in a crowded city during the time they suffered this ailment. How were these injuries or conditions shaped by life in a CITY?
6. These stories illustrate how health is affected by social circumstances. These “social determinants of health” include the factors listed below. Which of these factors (one or more) do you think might have contributed to what happened to this person? Briefly explain your answer.
   - housing and/or sanitation
   - poverty
   - diet and nutrition
   - social status
   - education
   - gender
   - air and water quality
   - expectations of authority figures affecting their job

7. If you were this person (or this person was in your family), what kind of help or support would you want or expect from (a) community and business leaders? (b) government? (c) medical professionals? (d) other organizations [which ones]?
8. There are many differences between health knowledge and treatment in the past and the present. What differences can you think of? (Hint: toilets and sanitation, lack of antibiotics, no knowledge about bacteria or viruses, different theories of medicine.)
9. What class-related or cultural issues from the past are still true in many places in the world today? (Possible answers: slavery and violence against women, economic inequities in who gets quality care, many different cultural beliefs about herbal, folk, and non-traditional healing, oppressive working conditions; moving to the city to seek work; toxic water and unsafe housing.)
10. Can you think of a modern example from urban life today (or perhaps your own extended family history) that is similar to this person's story? (Hint: think of news stories, examples from literature, family narratives, personal encounters with urban conditions.) Briefly describe (a) the example, (b) its context, (c) what caused the modern health-related problem(s), and (d) real or ideal responses possible to address it.
Case 1: Ancient Egypt: Working for Pharaoh at Tell el-Amarna

Comment:
Archaeologist Barry Kemp of Cambridge University (UK) leads the “Amarna Project” (http://www.amarnaproject.com), an excavation of the ancient Egyptian city of Tell el-Amarna located on the eastern bank of the Nile River approximately 194 miles south of Cairo. Tell el-Amarna was built during the reign of Pharaoh Akhenaten, circa 1349-1332 before the Common Era (BC). The city was built new from scratch as a monument both to Akhenaten’s new national government and to his controversial religious beliefs; when he died, the site was quickly abandoned. Akhenaten’s government used citizen labor (likely coerced) to build this city. Since the early 2000s, the Amarna Project has excavated more than 400 graves in one cemetery where thousands of the city’s people were buried. This case, and the next two cases below, illustrate the health risks—including injuries and trauma—that these workers experienced.

The table below outlines health risk-related findings from all the skeletons examined from the workers’ cemetery. Discussing this table can help students learn how archaeology measures health risks and can also introduce students to basic graphic literacy:

<table>
<thead>
<tr>
<th>Pathology or Evidence of Injury</th>
<th>Total number of Individuals Evaluated</th>
<th>Individuals Identified with this Condition</th>
<th>Individuals Severely Affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evidence of Damage due to Heavy Labour (workload): Degenerative joint disease (DJD) and trauma:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DJD – upper limb</td>
<td>91</td>
<td>60 (65.9%)</td>
<td>12 (13.2%)</td>
</tr>
<tr>
<td>DJD – lower limb</td>
<td>88</td>
<td>42 (47.7%)</td>
<td>19 (21.6%)</td>
</tr>
<tr>
<td>DJD – spine</td>
<td>90</td>
<td>51 (56.7%)</td>
<td>32 (34.6%)</td>
</tr>
<tr>
<td>Trauma – upper limb</td>
<td>92</td>
<td>20 (21.7%)</td>
<td></td>
</tr>
<tr>
<td>Trauma – lower limb</td>
<td>89</td>
<td>10 (11.2%)</td>
<td></td>
</tr>
<tr>
<td>Trauma – trunk</td>
<td>95</td>
<td>53 (55.8%)</td>
<td></td>
</tr>
<tr>
<td>Evidence of Nutritional Deficiency:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cribra orbitalia</td>
<td>103</td>
<td>44 (42.7%)</td>
<td></td>
</tr>
<tr>
<td>Porotic hyperostosis</td>
<td>105</td>
<td>3 (2.9%)</td>
<td></td>
</tr>
<tr>
<td>Scurvy</td>
<td>158</td>
<td>8 (5.2%)</td>
<td></td>
</tr>
</tbody>
</table>

Data Courtesy Amarna Project

Terms: 2

Cribra orbitalia: Spongy bones (bones with more air spaces than usual) around the eye sockets and forehead, caused by anemias3 and a “general indicator of poor nutritional status.”4

2 Source: Kemp B et al. Life, Death and Beyond in Akhenaten’s Egypt: Excavating the South Tombs Cemetery at Amarna. Antiquity 2013; 87: 64-78.
Porotic hyperostosis: Spongy bones (bones with more air spaces than usual) of the skull, caused by anemias
Scurvy: Caused by long-term lack of vitamin C; identifiable after death by bone abnormalities
DJD: Degenerative joint disease, caused by repetitive wear on the joints due to extreme physical activity
Trauma: As used in this chart, means broken bones

This graphic table illustrates a range of health conditions found in more than 100 persons buried in the workers’ cemetery. Not all of these conditions are injuries or trauma, but all of them relate to life as a laborer in an ancient city. Examples of degenerative joint disease (DJD) and nutritional deficiencies found in the ancient world are illustrated further in the next two cases (below). Describing the examples of trauma (i.e. broken bones; the final three entries under “Workload” in the table above), the archaeologists write, “Adult trauma levels at Amarna were... extremely high, with 67.4 percent (64/95) of adults exhibiting at least one healed, or healing fracture. This is again consistent with a population working at hard and somewhat dangerous jobs.” While the sample is only a fraction of the total number of people buried here, due to the careful excavation strategy, the individuals in the study are representative of the total population in the South Tombs Cemetery. Additional excavations might turn up interesting cases, but it would not change the overall patterns of trauma, workload stress, or nutritional deficiency that illustrate the living conditions for this population.

Relevance for Today:
The chart above reminds us that the connection between health conditions and working conditions is complex. Working conditions probably contributed directly to these workers’ degenerative joint disease and broken bones. But their malnutrition—scurvy and anemias—developed over years in response to available food and possibly other diseases or factors (like worms; see Case 9 below) that affected nutrient absorption and digestion. Yet both malnutrition and bone and joint disabilities affect a worker’s experience of the workplace and his or her productivity. The numbers in the chart add up to more than 200 because individuals could be assessed for more than one condition at a time. Whether they had a particular condition is reflected in the “Affected” column. The findings only illustrate diseases that could be measured by bone studies, so these individuals may have suffered from other conditions as well.

Questions for Discussion:
Do you know of places in the world today where people work long hours at hard manual labor for basic survival? Think about what it would mean to live and work in a community defined by such brutal work, where such symptoms are probably considered “normal.” In most cases such jobs are “forced” by economic necessity, without choices about work hours, conditions, or the repetitive weight of the job.

Choose a modern example and discuss how it might affect the workers’ health. Modern examples could include, for example: miners; those who stand for long hours at assembly line jobs; workers at meat packing plants; prisoners engaged in forced manual labor; construction workers in places without labor unions or worker’s compensation; and brick workers in parts of the world today (see Case 2).
Case 2: Back-Breaking Work

Above, left to right: vertebra with evidence of spinal degenerative joint disease (DJD); depression in a vertebra (Schmorl’s nodes) that can be due to a number of causes, such as traumatic compression due to accidents or catching a heavy falling object; collapsed vertebrae; carving of a worker carrying one of the heavy limestone blocks used to build the city.

To view original images:
- **Man carrying block**: [https://www.brooklynmuseum.org/opencollection/objects/3712](https://www.brooklynmuseum.org/opencollection/objects/3712). Reproduced under Creative Commons license.

Comment:
The photos above illustrate examples of back problems from degenerative joint diseases (DJD), commonly caused by repetitive excessive pressure on the shoulders, back, and spine that gradually damages the joints and bones. The archaeologists suggested that bone trauma was probably caused by the speed and relentless pressure under which laborers and their bosses worked to build the city quickly. Without modern equipment to move heavy objects, the workers hired to build the city were forced to carry heavy limestone blocks on their shoulders (see image above at far right). Each block weighed approximately 70 kg. (approximately 154 lbs.). This block illustrating one of the workers, found at El-Ashmunein, probably originally came from a building at Amarna.

Relevance for Today:
Brick workers in parts of the world today face similar health risks. Below are links to three contemporary news stories; the first two illustrate examples of risk, and the third reports on one community’s response:


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5 Source: Kemp B et al. Life, Death and Beyond in Akhenaten’s Egypt: Excavating the South Tombs Cemetery at Amarna. Antiquity 2013; 87: 64-78, the image here is on p. 73.
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Questions for Discussion:

- Do you know anyone whose work involves repeated lifting of heavy objects? (Hint: think about food delivery, the postal service, and parcel transport services.) Describe what you know of the work required in this person’s occupation, and its potential effect on health.
- How do workers in the modern world protect themselves from on-the-job back and bone injuries? (Hint: think about (a) machinery and equipment used to help relieve and balance heavy weights; (b) national laws such as occupational safety regulations at the workplace; (c) levers, pulleys, and braces; (d) nutritional requirements to build and maintain strong bones; (e) medical costs of injuries and workers’ compensation.)
- What health risks might be most important to consider in the case of child laborers? Why?
Case 3: The Short-legged Child

Comment:
Delayed bone growth is typical evidence of a variety of potential life stressors; inadequately developed bones can point to life experiences that might include disease, malnutrition, and even psychological stress that occurs during the period when bones are growing. Archaeological measurements on the bones of children found in the workers’ cemetery at Tell el-Amarna suggested that “the majority of Amarna children were experiencing significantly delayed growth, beginning at about 7.5 months and continuing throughout childhood.” These children were most likely the children of urban construction workers (see Cases 1 and 2). They may also have worked as child laborers on the construction sites.

Image at left: Right femur of a typical 8.5-year-old (on the left of the photo) and right femur of an 8.5-year-old child with delayed growth (photo center). The age determination is assessed with mandibular tooth development (right). Image copyright Amarna Project, used with permission.

Relevance for Today:
Nutritionists and health professionals around the world today recognize “short stature,” especially in children, as a common indicator of chronic deprivation, diseases, or related life stressors. If a child is shorter than normal due to chronic deprivations (and not just short because it’s in their genes), they may suffer other health-related conditions as well as possible learning limitations that will affect lifelong wellness and socioeconomic opportunities for them to thrive as an adult.

Questions for Discussion:
- What kind of social or economic circumstances today might prevent a child from having regular access to a proper balance of nourishing foods throughout their childhood? (Keep in mind that the evidence of the bones of this 8-year-old child in the photo show that it survived the risks of infancy and early childhood. Its short bones remind us that it may have suffered other ailments that are not so easily measured by the archaeological evidence.)
- Can you think of situations or places where children around the world today may face similar risk from chronic lack of the food they need to grow and thrive?

Case 4: Public Violence for Entertainment


**Comment:**
These photos illustrate injuries found on the skeletons of two men buried in York, England. The cemetery included more than 80 individuals, each under 45 years of age. All bodies showed signs of extreme violence and physical stress. The archaeologists who excavated the site hypothesized that these individuals were probably gladiators who were in England during the ancient Roman Empire; they might also have included soldiers or criminals. The man whose skull is on the left above was probably killed by the weapon that split his skull; the jaw injury on the right is also typical of gladiatorial combat, but may not have been fatal. Other skulls showed possible evidence of animal teeth. Gladiators who entertained in the ancient sports arena—fighting each other or wild animals, often to death—were often slaves or persons of low social class whose lives were devoted to physical training and competitive combat.


**Relevance for Today:**
Think about modern occupations that involve extreme performance-related sports and which are celebrated in different cultures as exciting public entertainment. Common examples might include football, boxing, car-racing, bull-fighting, training for the Olympic Games, other extreme athletics, or more informal “dare” and challenge encounters. The injuries that such individuals suffer in extreme sports competitions today will vary widely depending on the sport but typically include broken bones, extreme physical trauma, and sometimes life-changing brain injuries.

**Questions for Discussion:**
- What do you think the health of such individuals is like before they experience competition-related injuries?
- Why do people agree to participate in violent competitive combat or extreme athletics? What social or cultural factors shape their choices?
- What do such activities and injuries suggest about the health values of a society that promotes such sports?
Case 5: Child Labor Under the Volcano

Comment:

The ancient wall painting above illustrates how small fishing boats in the Roman world depended on young rowers, some of them children. In the 1990s, Dr. Luigi Capasso, an Italian archaeologist, identified the damage children could suffer in such an occupation when he analyzed an abnormally worn shoulder bone and joint of an 8-year-old child, likely a boy. The child had died in the town of Herculaneum as a result of the volcanic eruption of Mount Vesuvius, on August 24 in the year 79 of the Common Era (CE). This child was one of the many people whose body was buried (and preserved) under the blanket of ash that fell from the sky and covered the site for centuries.

The study of human remains from the ancient cities of Pompeii and Herculaneum has uncovered evidence of many health conditions, including traumatic injuries, suffered as a daily reality by those who were alive on the morning of the eruption. The child whose bones Dr. Capasso examined showed evidence of extreme chronic stress to his right head-and-shoulders region (in anatomical terms, the costoclavicular ligament). According to Dr. Capasso, such injuries are caused by “heavy continuous manual labour, for example the hand-tilling of fields or the rowing of boats....Small fishing boats frequently appear in the Pompeian and
Herculaneum frescos and their use could be the cause of the lesions,” said Dr. Capasso, who found evidence of this condition (called syndesmoses) in more than 40 percent of men, 6.5 percent of women, and 11.5 percent of children, “including one who was about 5 years of age.”


Think about how this child’s situation might have been similar to or different from Case 2 above, of workers in the Tell el-Amarna urban construction site. Imagine that the boy survived the volcanic disaster and grew up to adulthood. What do you think his health would have been like?

**Relevance for Today:**

The evidence of extreme wear in the eight-year-old child’s bone reminds us that child laborers often work hard at excessive weight-bearing labor from a very early age. In concluding his report on the case, Dr. Capasso reminded readers that, “The lesions reveal an ancient society in which children, even of the youngest age, engaged in heavy manual labour; a scourge that still affects at least 375 million children throughout the world today.”

**Questions for Discussion:**

1. What do you know about children who suffer from health effects of child labor in the world today?
2. What kinds of injuries or health effects do they face as risks? (Hint: look at the discussion suggestions for Case 2, above.)

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Case 6: Teething Rings: Survival and Stressors in Medieval London

Comment:
These teeth belonged to an adult who lived in medieval London. The horizontal grooves (indicated by arrows) are signs of linear enamel hypoplasia, or places where the tooth enamel formed defectively and is thinner than the enamel elsewhere on the tooth. This defect, seen here in an image by biological anthropologist, Dr. Sharon DeWitte, means that this person experienced physiological stress in early childhood, between ages six months and six years, that interrupted the growth of their bones and teeth. Such stress might be caused, for example, by famine or infection. (You might compare these grooves to looking at environmental change in the weather through studying tree rings).

Dr. Dewitte wanted to know if a person who had experienced such childhood stressors was more or less likely to die if faced with famine later in life, as an adult. Did such stressors help or hurt physiological resilience? She examined bone evidence from 1,500 adults who were buried in the cemetery of a charity hospital in the city of London between 1120 and 1540. The people buried there included both the poor and religious personnel and wealthy benefactors. Some had enamel hypoplasia and some did not. Dr. DeWitte found that people with these dental lines indicating deprivation in early life seemed to be more likely to die of famine later in adulthood. She came to this conclusion by comparing the dental evidence with evidence that she found of repetitive stress trauma to the leg bones of bodies in the same cemetery. Leg trauma likely happened due to infections during adulthood, accidents, or even putting excessive weight on the bones due to very hard work. She noted that the people with bone growths from stressors to the long (leg) bones seemed more resilient, more likely to survive famine and die later, of other causes. Both groups died as adults, but the group that experienced environmental stress in the medieval city of London as infants and children (affecting their teeth) were more vulnerable to health risks in adulthood.

Relevance for Today:
DeWitte’s research reminds us that infant and childhood health can affect health many years later, as an adult. One example from modern history is that of 20th-century research on children born during the “Dutch Hunger Winter.” During World War II, Nazi-occupied Holland suffered extreme food shortages during the winter of 1944-1945. Children who were conceived and born during and immediately after that winter in Holland were more likely to suffer particular health conditions depending on when in their development they had suffered worst prenatal or early infant deprivation. The effects of short-term acute starvation mattered even though the children who survived were in most cases able to get plenty to eat in the years that followed. Many of these individuals are still alive today, now in their 70s.

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For Discussion:

Below are several reports, news stories, and websites where you can learn more about the influence of the “Hunger Winter” on health across the lifespan. The research shows particular evidence in the case of diabetes and cardiovascular disease. Browse one or more of these reports and discuss what these findings might mean for modern famines and crises due to disasters and conflicts.

The Dutch Famine Birth Cohort Study/Hungerwinter Study.  


Case 7: Burying Babies

Comment:
Infant and child mortality rates were very high in the ancient world. Even though archaeologists have uncovered many infants’ and children’s bones from the past, it is often impossible to know exactly how they died, but it was most likely from diseases related to malnutrition, bacterial diarrhea from dirty water, or environmental injuries.

Several mass child burial sites found in ancient cities offer further clues to what the short life of urban children was like in the ancient world. Below are stories from three different locations.

Greek Islands
On the Greek island of Astypalaia, just outside the ancient classical city of Chora, excavators found the largest infant cemetery in the world. The “Kylindra” cemetery—named for the ancient clay cylindrical pots that served as caskets—contains the remains of more than 2,800 children buried between about the year 600 before the Common Era (BCE) into the Roman period. Most died at birth or soon after; all died before age 3. While most of the bones are too tiny and fragile to measure health status, the archaeologists and their students in the summer bioarchaeology field school continue to research the remains, including many baby teeth.

Learn more about the project and view images of a pot and its infant bones: http://www.ucl.ac.uk/archaeology/research/projects/astypalaia/brokenpot

Image: Ancient Greek pot similar to those in the infant cemetery at Astypalaia. Photo by Ty Deyoe; reproduced under the Creative Commons license.

Jerusalem
In Jerusalem, more than 15,000 human skeletal remains were found in the sixth-century men’s monastery of St. Stephen inside the ancient city walls. Archaeologists were surprised that more than one-third of those interred were infants, children, or young adolescents. Bone isotope studies showed that children who died had been breastfed for more than a year, and weaned gradually. They were not malnourished. No one knows why so many infants and children were buried among the bones of this affluent men’s monastery; was it an orphanage? A place for healing? In the ancient Near East, sick and hungry poor often turned to religious communities for healing and medical care, but we don’t know if St. Stephen’s monastery was such a place. It is also possible that many were pilgrims and refugees, since many came to Jerusalem at this time due to war, invasion, and plague, often traveling extensively from place to place.


Lugnano, Italy
In the town of Lugnano, Italy, some time in the fifth century CE, residents of a large ancient Roman villa hurriedly converted five rooms of a former kitchen and storage area into an emergency cemetery. There they buried 47 infants (and 13 young dogs). The villa itself was in ruins at the time, probably as a result of barbarian invasions, with evidence of recent fire, debris, and rubbish. The infants included 22 premature infants; most of the others were only a few weeks or months old. Like the babies at Astypalaia, those at Lugnano were interred in pots, or else within a crude “house” shaped out of ceramic roof tiles. In some places it appeared that a number of the infants had been buried at about the same time. The burials were simple, suggesting those who buried them were poor. One baby was buried with a tiny bone doll, another with a raven’s claw, suggesting amulets common in folk practices for health in the ancient world. The oldest child, a girl about three years old, was buried with great care in a separate room. Plant remains found amidst the debris suggest that this mass burial took place late one summer. Archaeologists hypothesize that the children died from a sudden malaria epidemic. Remnants of hemozoin, produced by the malarial parasite, were indeed confirmed in samples from the children’s bones. The Lugnano villa was in a rural site, on a hill about 60 miles north of the city of Rome, but malaria was a common problem in cities as well across the ancient world. Were the people who found shelter in this ruined villa and their sick children urban refugees fleeing war and destruction? We will never know.

Relevance for Today:
Infants and children continue to face life-threatening health risks today around the world. Think about examples you may be familiar with from the news or discussion with family and friends.

Questions for Discussion:
• What kind of communities today experience high rates of infant mortality? What do you know about how such children are buried? (Hint: Those who live in poverty; children whose mothers are at high risk of maternal mortality due to inadequate obstetric health care and delivery. Students may need to search for current information about the burial practices of young children in such settings.)
• What situations cause children to gather together in groups within an organization (such as those buried in Jerusalem, described above)? Why might children subject to traveling as refugees or living in a group environment experience health risks? What are some of the protective and public health measures today that attempt to reduce such risks? (Hint: vaccinations, sanitation and hand-washing.)
• Malaria is still a high risk for children today; do you know where these children live and why they are so vulnerable to the disease? What other modern epidemics and humanitarian crises can you think of that might pose special health risks for children? (Hint: think about Ebola; children born to HIV-positive mothers; health risks faced by refugee children around the world).

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Case 8: Broken Ribs in a Roman Army Camp

Comment:

The photo at left illustrates the broken rib of one of the children who lived at Poundbury Camp, an urban settlement of Roman soldiers in Dorset, Britain, between the first and fourth centuries of the Common Era (CE). This break, says archaeologist Mary Lewis, who studies these bones, resulted from trauma.

Life at Poundbury Camp, says Lewis, “was detrimental to the health of the children living there, with high levels of malnutrition and possible evidence for physical abuse.” Of the camp’s 1,400 graves from this period, archaeologists identified 364 bodies of children under age 17. Not only did many of these children have broken ribs (“commonly associated with physical child abuse”), but their bone evidence of malnutrition reveals that they also suffered from diseases such as rickets (due to lack of sunlight and vitamin D), scurvy (lack of vitamin C), and malaria. Eleven had extremely thin bones, suggesting “a systematic condition such as severe malnutrition.” These 11 children may have been inactive, perhaps even disabled, with poor muscle tone. They were likely born to mothers who also suffered from malnutrition. The prevalence of cribra orbitalia (defined in Case 1) was unusually high (38.5 percent) compared to Roman-era bones of children from other sites in Britain, suggesting these youth suffered from “poor nutritional status, as the result of a lack of fresh vegetables and meat, a high pathogen load, parasitic infections, or diarrheal disease.”


Relevance for Today:

Childhood injuries remain a commonly reported cause of illness and death around the world today. Injuries are not always related to child labor or abuse; the most common causes may include, for example, road traffic accidents, injuries, drowning, burns, falls, and poisoning. Environmental safety matters; a 2017

13 Lewis ME. Life and Death in a Civitas Capital: Metabolic Disease and Trauma in the Children from Late Roman Dorchester, Dorset. American Journal of Physical Anthropology 2010; 142: 405-416.

Image: A child’s fractured rib from Poundbury Camp (left second rib, bottom), caused by trauma. Photo © Trustees of the Natural History Museum, London. Used with permission.
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A review of under-5 mortality in China over the past 20 years noted that accident and injury was reported as the single most common cause of child death in rural areas.\textsuperscript{16}

Questions for Discussion:

- Why do children break bones? Think about why a child might break a rib, as in the image above.
- What urban settings in today’s world put children at increased risk of accident and injury similar to the children at the Poundbury Camp?\textsuperscript{17}
- Think about the age-related differences in how children get hurt, from infancy through adolescence; how would injury risks vary at different pre-adult stages?
- Do you think accidents and injuries are related in any way to poor nutrition in today’s urban environment? Why or why not? Discuss how accidents, injuries, and nutrition may (or may not) be related to child abuse in the modern world.

\textsuperscript{16} He C et al. National and Subnational All-Cause and Cause-Specific Child Mortality in China 1996-2015: A Systematic Analysis with Implications for the Sustainable Development Goals. The Lancet 2017; 5(2):e18868-e197. DOI: http://dx.doi.org/10.1016/S2214-109X(16)30334-5. The data is based on government reports; it is not clear from the report what the most common accidents and injuries were, or how rural children’s living conditions differ from those of children in Chinese cities as it relates to safety issues.
Case 9: Nakht, the Teenage Weaver

Comment:
The teenage boy named Nakht, from ancient Egypt, was a weaver for the Pharaoh, Setnakth, who died around 1198 before the Common Era (BCE).18 The image at left is from a wall painting found in his tomb in 1907. As a weaver, Nakht used local flax fibers to make linen, which was the common fabric for Egyptian clothing at this time. When he died, he was wrapped in linen (was it linen he had woven?) and buried in a sarcophagus decorated with his name and occupation. Most Egyptian mummies found buried in sarcophagi had been elaborately embalmed after death, using expensive materials with their inner organs removed. Nakht’s burial process was much simpler: his body was simply placed in the sun along the Nile and left to dry, his inner organs intact. Nakht was about 5’5” tall, but his body, dehydrated, weighed only about 12 lbs.

A high-technology radiograph of his body and autopsy published in 2014 provide insights into health conditions that Nakht lived (and died) with, and hint at what everyday life was like for this teenage laborer.

Nakht’s autopsy revealed that he suffered from several ailments that probably made everyday life painful, uncomfortable, and sapped his energies. His liver, bowel, kidney, and bladder were infected with four different parasites, including schistosoma, tapeworm, trichinella (often caused by eating undercooked pork), and plasmodium falciparum, which causes malaria. Schistosomiasis, still common in Egypt today, can cause itching, fever, chills, pain, and muscle aches. Nakht also had pulmonary anthracosis, a condition caused by inhaling smoke (usually from cook fires or smoky fires related to one’s employment), resulting in carbon deposits on the lungs that make it hard to breathe.

View images of Nakht, including his mummy and his carefully painted sarcophagus with his name and occupation: http://dx.doi.org/10.1016/j.jjcc.2013.12.012.

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Relevance for Today:

Nakht’s story reminds us that not all children and adolescents who suffer health conditions are necessarily working in abusive or slave-like conditions. Nakht’s burial methods suggest that even if he was poor, his burial in a sarcophagus connected with royalty suggests that someone with adequate funding cared about him enough to honor him in his death. He most likely died from his diseases rather than from his working conditions. Children and youth in cities today may also suffer health problems due to their living conditions and not to any mistreatment by those around them.

Questions for Discussion:

- Think about the following examples of environmental health risks that can affect children today: lead poisoning; asthma as a chronic condition related to air pollution and urban housing; tuberculosis due to living in a crowded house or neighborhood; or rickets (soft bones) due to lack of sunlight combined with chronic malnutrition. Where do you think such children live and what makes them sick? (Read more about lead poisoning in the United States in the Incubator’s teaching pack, “Flint, Michigan: Lethal Water.”)

- How are children today affected, as Nacht was, by potential lung problems due to chronic smoke inhalation? (Hint: Tobacco; Learn more about how tobacco smoking continues to affect children around the world in the 2017 report from the World Health Organization, “Tobacco and its Environmental Impact.”)
Learn More About Health in Ancient History

There are many different sources available on health and disease in antiquity, including health and disease in the ancient city. A small selection of free online resources are listed below.

This master’s thesis analyzes bones for trauma and illness in the remains of 268 individuals buried in an Egyptian community during the time of the Roman Empire. Key findings include evidence of interpersonal violence and occupational trauma in men and women. Photographs illustrate evidence of head trauma, unhealed stab wounds, and broken arms and legs.

This personal website features open-access peer-reviewed research on health and the environment in antiquity by history professor Kyle Harper, provost of the University of Oklahoma. Relevant articles available in mid-2017 include: “Framing the Fifth-Century Climate”; “Smallpox: Resources and Thoughts”; “Lecture on History, Genetics, and Infectious Diseases”; “Prices, Rents, and Wages in the Roman Empire”; and “Plague of Cyprian: Another Eye-Witness.” Professor Harper’s work on one ancient plague offers unique insight into potential links with the modern Ebola epidemic.

This interactive site for school-aged children presents four individuals selected from archaeological sites in Roman Britain. Online students can explore them either through “digging up” their graves or through following The Roman Mysteries, short stories written by Caroline Lawrence and illustrated by Aaron Watson. The site is specifically designed for use with children in primary school in the UK, but could also be a useful introduction to archaeology and ancient history for students in the United States. The site also includes a free downloadable teaching resource to help teachers design lesson plans, a sample handout, and select related links.

This free online academic research bibliography, last updated in December 2016, lists more than 2,000 bibliographic entries of scholarship on ancient childhood by historians, classicists, art historians, and archaeologists. It was launched in 2003 and has been repeatedly expanded and updated. The author is a historian who holds teaching appointments at the University of Tampere, Finland, and the University of Oslo, Norway.