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**Richard Steckel, Clark Spencer Larsen, Charlotte Roberts & Joerg Baten (Eds.), *The Backbone of Europe: Health, Diet, Work, and Violence over Two Millennia*, Cambridge University Press, 2018, 476 pp. \$85.43 Hardcover**

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**Abstract.** When traditional measures for material welfare are scarce or unreliable, a population's average stature reflects its cumulative net nutrition during economic development. In the 1970s, Robert Fogel and his graduate students led the effort to integrate statures as an economic measure for welfare with their studies of American slavery, and the use of anthropometrics has been extended to various fields in economics, development, and economic history (Fogel & Engerman, 1974; Fogel, 1989; Fogel, 1994). Few scholars have done as much to advance the use of height and anthropometric measures as Richard Steckel, a Fogel graduate student. Demonstrating extraordinary creativity to bring yet another measurement tool that sheds light on economic conditions, Steckel has extended the use of stature of the living to the skeletal remains of the dead.

**Keywords.** Europe, Health, Diet, Work, Violence.

JEL. H51, H75, J01, J10.

### **Book review**

**W**hen traditional measures for material welfare are scarce or unreliable, a population's average stature reflects its cumulative net nutrition during economic development. In the 1970s, Robert Fogel and his graduate students led the effort to integrate statures as an economic measure for welfare with their studies of American slavery, and the use of anthropometrics has been extended to various fields in economics, development, and economic history (Fogel & Engerman, 1974; Fogel, 1989; Fogel, 1994). Few scholars have done as much to advance the use of height and anthropometric measures as Richard Steckel, a Fogel graduate student. Demonstrating extraordinary creativity to bring yet another measurement tool that sheds light on economic conditions, Steckel has extended the use of stature of the living to the skeletal remains of the dead. Over the last 20 years, Steckel and his research teams have developed the *Global History of Health Project* to advance a modern research project that uses international samples of skeletal remains to evaluate conditions in

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economics, history, and anthropology. *The Backbone of History* was the first book in this project, which considers how skeletal remains are used to evaluate biological conditions in the Western Hemisphere (Steckel & Rose, 2002). The second book from this project has now been published with *The Backbone of Europe: Health, Diet, Work, and Violence over Two Millennia* (Steckel et al., 2019).

A health index weaves the project together that uses skeletal remains of stature, oral health, linear enamel hypoplasia, osteoarthritis, cribionorbitalia and parotic hypertosis, trauma, periosteal reaction, and skeletal infections. Stature is inferred from the femur or the “long bone.” Like height, fully developed femurs indicate better net nutrition; whereas, shorter femurs indicate cumulative net nutritional stress. Oral health is measured by dental caries, as well as inflammatory and non-inflammatory periodontal disease. Poor oral health reflects unhealthy diets, infectious disease, and dental trauma. Linear enamel hypoplasia is an oral condition where during periods of nutritional privation, tooth enamel fails to develop correctly and leaves bands of under developed tooth enamel and is a sign of malnutrition. Recent research suggests there may be a relationship between periodontal disease and cardiovascular disease, high blood pressure, clogged arteries, and stroke. Osteo-arthritis and degenerative joint disease results from the breakdown of cartilage and underlying bone. Causes of degenerative joint disease include joint stress associated with strenuous work environments and reflects occupational and physical conditions. Cribiaorbitalia and parotichyperstosis are areas within the cranial vault of spongy or porous bone tissue and are pathological conditions that affect bone mass associated with anemia and iron deficiency. In physical anthropology, cribia orbitalis is evidence that past populations suffered from mal-nutrition. Trauma illustrates disruptive events associated with physical, political, and economic events, which can also illustrate physical stress associated with the physical environment. Periosteal reaction is the formation of new bone in response to injury or trauma and results from a wide source of causes that indicates physical stress. These markers are imprinted on skeletal remains and used in *The Global History of Health Project* to highlight historical net nutrition, physical stress, and disease environments for both European and North American populations.

*The Backbone of Europe* begins by examining dental carries, linear enamel hypoplasia, periosteal reaction, cribionorbitalia, parotic hypertosis, trauma, and skeletal infections in developing medieval Europe. The vanguard chapter is Steckel & Kjellström (2019) that integrates these skeletal conditions into a health index to assess conditions across Europe that reflects health during economic development. Subsequent chapters are devoted to each health development index component. Chronological periods to evaluate the seven health variables are divided into six periods: pre, early, high, and late medieval combined with early modern and industrial periods. There are five regional groups to analyze spatial

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relationships: Central and Southeastern Europe, the Mediterranean, Northwestern and Northeastern Europe. Settlement type and topography provide additional geographic context. To the extent possible, socioeconomic status, social organization, and subsistence agriculture provide insight into social and economic relationships during European history and economic development. The majority of chapters evaluate each of these seven archeological health measures by time, social context, and place.

Physical stature is a cumulative measure for calories consumed, less calories required for work and to withstand the physical environment. Stature in bioarcheology is measured by femur or long-bone length (Marquez *et al.*, 2019). An important finding in modern stature studies is that population's average statures declined during early urbanization periods and industrialization when the claims from the physical environment and work off-set nutrition consumed (Komlos, 1987; Carson, 2009a). Europeans similarly experienced periods of stature variation during the last 1500 years. European average heights varied regionally and attained their highest levels in pre-medieval Northeastern Europe. Stature can be either positively or negatively related to urbanization (Bereczki *et al.*, 2018, p.187). When population densities are low, larger population densities may be associated with taller statures because population density extended output markets and decreased the relative cost of food production (Carson, 2010; Carson, 2009b; Carson, 2009c, Carson, 2013). However, after a threshold of population density is reached, higher population densities increase demands on the physical environment and increase the relative price of nutrition associated with shorter average statures (Carson, 2010). Increased population density also puts nutritional stress on resources when populations concentrate in close proximity, increasing the propagation of infectious diseases, which are inversely related to stature. European stature and bone robusticity were inversely related with urbanization, technology, and labor saving devices, which reduced the physical demand on the human physique.

The bioarcheology of dental health reflects much about the agricultural production and economic activity of past populations. Dental caries reflect the types of crops raised and diets in an economic system (Witwer-Backofen, & Engle, 2019). Agricultural areas and population that specialized in high carbohydrate crops were more likely to have dental caries. For all of Europe, greater ante mortem tooth loss and dental caries were positively related to age, and women demonstrated a slightly higher rate of poor dental health than men. Moreover, the incidence of dental caries varied with time, and there was an increase in caries between the medieval early periods and Industrial Revolutions. European caries were higher in early urban areas compared to rural areas. These patterns in dental caries may also reflect European health because some research indicates there is a relationship between cardiovascular disease, high blood

pressure, clogged arteries, and stroke related to periodontal infection and inflammation.

Poor dental hygiene and diets reflect nutritional and economic conditions, and ante mortem tooth loss reflects poor dental health. Linear enamel hypoplasia is another area in historical oral records where tooth enamel fails to correctly develop with a reduction of tooth enamel during development (Berecski *et al.*, 2019). Linear enamel hypoplasia is a sign of malnutrition and represents considerable physiological stress related to diet. In Europe, there was an upward trend in linear enamel hypoplasia, indicating deteriorating health during medieval period and Industrial Revolution. Linear enamel hypoplasia was also related to residence, and European urban residents were in areas of higher rates of linear enamel hypoplasia, indicating that health and net nutrition were adversely affected by urbanization and in poorer conditions compared to rural areas. Over time—as measured by oral health and development—European nutritional status declined between the early medieval period through the 19<sup>th</sup> century.

Periosteal reaction is the formation of new bone associated with injury and the periosteum that surrounds bone tissue, and in bioarcheology, greater periosteal reaction is associated with better health (Marques *et al.*, 2019). Compared to women, European men had higher rates of periosteal reaction across all age groups, and farming communities had higher rates of periosteal reaction compared to non-farming communities. That men were more affected by periosteal reaction is well-known and supports what is known about European labor markets, where men were physically more engaged with agricultural occupations and exposed to occupational stress and trauma.

Osteoarthritis and degenerative joint disease are related to stature, age, and nutrition, and both increase with age and are related to occupation and the physical environment (Williams *et al.*, 2019). Cohorts within populations that have physically more demanding lifestyles are more vulnerable to degenerative joint disease than populations in less physically active lifestyles. Male workers were historically in occupations that required greater physical activity, and European male skeletons in agricultural areas had greater rates of osteoarthritis and degenerative joint disease than elsewhere. Males had higher rates of osteoarthritis than females, and osteoarthritis and degenerative joint diseases decreased with European industrialization. Nonetheless, across Europe, there were few geographic differences for osteoarthritis and degenerative joint diseases, indicating that occupational physical activity and skeletal stress were geographically similar.

There is little to criticize about *The Backbone of Europe*. Like Steckel and his co-author's other work, the book and project are foundational and a starting point for researchers in bio-demography, anthropometrics, and economic history. *The Backbone of Europe* also clarifies areas in recent anthropometrics regarding the effects of urbanization (Komlos & A'Hearn, 2017; Komlos, 2019). Nonetheless, there are questions and concerns about

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selection, and while selection is addressed briefly in early chapters, it is not until page 233 in Meinzer et al., that the issue is addressed at sufficient length. For bio-archeologists and economic historians, an extended discussion regarding selection is better positioned in earlier chapters. Across geographic regions and over time, different soil types, cultures, burial practices, and nutrition were related to different physical conditions associated with whether skeletal remains survived to be examined. How may these have affected the analysis? Was there an age bias regarding an individual's age at internment and the survival of the skeleton? Were the skeletons of adults relative to children more likely to survive because they were interred? Could burials depend on episodic mortalities? How does climate affect the likelihood a skeleton survives? Other questions linger for the less informed and could have been anticipated by the authors for each chapter.

*The Backbone of Europe* and *The Backbone of History* are similar foundational texts that are well done and are vital contributions in bio-demography, archeology, and economics. *The Global History of Health Project* is like the authors' other works and provide the backbone for research that will last a generation.

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