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Title: Life in transition: an osteoarchaeological perspective of the consequences of medieval socioeconomic developments in Holland and Zeeland (AD 1000-1600)
Issue Date: 2016-11-03
Life in Transition

7.1 INTRODUCTION

This research investigated the physical consequences of the socioeconomic developments in the medieval period for the inhabitants of Holland and Zeeland. The central focus was how human skeletal remains can reflect the life alterations associated with medieval developments and how skeletal analyses can contribute to a better understanding of the impact of these changes. To answer the central question, three key aspects of medieval life were studied: disease and stress, activity, and diet. By comparing three different skeletal collections, two rural and one urban, and through the incorporation of historical information, this study presents a new perspective on socioeconomic development in the medieval period and the repercussions on the daily lives of people during these transitional times. This chapter presents the conclusions of this research in a structured way by providing answers to the subquestions and main research question outlined in chapter one. The chapter ends with a discussion on directions for future research.

7.2 SUBQUESTIONS

7.2.1 Subquestion 1: patterns of disease

- Which changes in patterns of disease and stress levels can be observed? Are there differences between the rural skeletal remains from earlier and later medieval times? In which ways do the rural collections differ from the urban collection?

The skeletal analysis of the three collections revealed that there are changes in the patterns of disease. Infections associated with high population densities such as tuberculosis or other lung diseases were not found in the collection of Blokhuizen, dating to the central medieval period before large-scale urbanisation took place. Considering that these villagers lived in
farms with large distances between the houses, this finding is consistent with the expected palaeopathological framework. In the late medieval rural collection of Klaaskinderkerke, diseases such as tuberculosis and other respiratory infections were also not encountered. Even though population numbers within Holland and Zeeland increased, population densities appear to have remained low enough for crowd dependent diseases such as tuberculosis to be unsustainable. In addition, the comparison of Blokhuizen and Klaaskinderkerke shows that stress levels were not visibly increased or decreased in the rural areas through time. These results suggest that socioeconomic developments in medieval Holland and Zeeland did not have any profound skeletally visible impact on the people living in the countryside with regards to disease and systemic stress.

In contrast, the comparison of disease prevalence between the rural and urban collections did reveal differences. Tuberculosis and evidence for non-specific lung infections were solely found in the urban skeletal remains suggesting that townspeople had a higher risk of developing these kinds of diseases than villagers. The relatively high population densities could have contributed to the apparent increase in respiratory disorders. Interestingly, however, the indicators of non-specific stress do not demonstrate a significant increase in comparison with the rural collections. In fact, cribra orbitalia prevalence is even slightly higher in the countryside. Taking into account the environmental factors in Blokhuizen and Klaaskinderkerke, it is hypothesised that the higher cribra orbitalia prevalence might be associated with a greater presence of malaria in the rural areas.

Direct skeletal evidence for the occurrence of animal diseases such as brucellosis or bovine tuberculosis have not been found in any of the skeletal assemblages. Although osteoarchaeological visibility is possibly a factor, the skeletal data suggest that animal diseases which may have posed a risk for people were of lesser significance in medieval society.

The comparison of disease and stress patterns between the rural and urban skeletal collections has demonstrated that episodes of stress were common in both town and country. These results suggest that both rural and urban inhabitants were faced with threats which physically impacted their lives. While the risks appear to have been different, one living environment cannot be considered better or ‘healthier’ than the other.

7.2.2 Subquestion 2: patterns of activity

- In which way did changes to physical activity patterns during the medieval period and especially during urbanisation impact the bodies of the citizens? Which differences can be observed between inhabitants of villages and towns? Is it possible to observe differences in the division of labour?
The differences in osteoarthritis prevalence and bone morphology suggest that activity patterns changed during the medieval period. Overall levels of mechanical loading seem to have stayed roughly the same through time. However, the separate comparison of men and women as well as that of specific joint groups reveal significant differences indicating that types of physical activity for both men and women changed through time. Hip osteoarthritis was very prevalent in the men from Klaaskinderkerke pointing to specific activities in this village. In addition, differences in the prevalence of osteoarthritis in upper and lower limbs indicate that activities changed over time. Osteoarthritis prevalence is substantially lower among the females of Alkmaar, suggesting that the shift to urban living had the most profound effect on the daily lives of women.

The data on bone morphology also suggest shifts in activity patterns. The most marked difference is between the collections from the Central and Late Middle Ages, and not between the town and country. Both the men and women from Blokhuizen experienced higher degrees of muscle pull than those from Klaaskinderkerke and Alkmaar. The fact that activities were reorganised in the late medieval period and that occupations for villagers and townspeople overlapped during that time, may account for the lack of difference between the late medieval rural and urban individuals. This suggests that socioeconomic developments in the late medieval period influenced the activity patterns of society as a whole, both in rural and urban areas.

The division of labour between men and women appears to have changed as well. A significant difference in bone shape between males and females existed in Blokhuizen, indicating that the activities they carried out required markedly different levels of muscle pull. This clear distinction in bone shape between men and women disappeared in Klaaskinderkerke. This does not necessarily mean that males and females carried out the same tasks, but it does suggest that their respective activities required similar levels of muscle pull. This can be related to the idea that the late medieval people living in the countryside were occupied with a broad range of activities, which could blur skeletal differences. Interestingly, the skeletal remains of Alkmaar demonstrate clear shape differences between men and women, indicating a more pronounced distinction between gender-related activity levels in the town.

The data on activity suggest that the medieval socioeconomic developments, which include more market-oriented production, the commercialisation of rural industries, and the increase in non-agrarian activities in both town and country, can be linked to skeletally recognisable changes in activity patterns of the late medieval people. The osteoarchaeological analyses demonstrated a clear shift in patterns of physical activities through time, with the lives of women being more profoundly altered by the transition to an urban environment.
7.2.3  **Subquestion 3: patterns of diet**

- Which evidence exists for a change in dietary patterns? Are there differences in consumed food types between the earlier and later medieval rural collections? In which respect does the rural diet differ from the urban diet? Is there evidence for a change in nutritional stress levels through time or as a result of urban living?

The caries data point to a change in dietary patterns. The comparison of Blokhuizen and Klaaskinderkerke shows changes in both caries prevalence and frequency, suggesting variations in the spectrum of consumed foods. The availability of protein, possibly fish, appears to have increased in the late medieval period. This is particularly evident in the caries frequency of the women in Klaaskinderkerke. For the men, on the other hand, the comparison of the caries frequency suggests an increase in carbohydrate consumption as well.

The comparison of the rural skeletal collections with the Alkmaar assemblage revealed significant differences in caries prevalence and frequency. The townspeople appear to have been consuming more cariogenic products than the inhabitants of Blokhuizen and Klaaskinderkerke. In addition, the fact that the younger adults in Alkmaar have significantly more teeth affected by caries than those in the other collections points to an earlier onset of caries and therefore to a high starch and sugar intake for the urban population. Isotopic data point to a shift in diet for the inhabitants of Alkmaar as well. The carbon and nitrogen isotopes suggest that the urban individuals were consuming different types of protein, most likely freshwater or marine fish. Additionally, the isotopic data indicate increased dietary heterogeneity in the urban population. From these data, it can be concluded that the town residents were consuming more cariogenic products and different types of protein than their rural counterparts. Since the populations under study are assumed to have had a similar socioeconomic status, this indicates that urban living influenced diet. Increased dependence on and access to the market, where a wide variety of products could have been obtained, may have been responsible for the observed dietary shift.

The analysis of vitamin deficiencies in combination with the indicators of non-specific stress does not point to a change in nutritional stress. Evidence for a vitamin D deficiency is found only in Klaaskinderkerke. However, considering the similar prevalence of other stress markers between the sites, it is hypothesised that this higher prevalence is related to shielding from the sun by spending more time indoors or wearing occlusive clothing. The apparent increase in residual rickets may be associated with the changes in activity patterns in the late medieval period: the decrease of agricultural activities and increase in commercial activities may have resulted in more tasks carried out within the house.
The combination of caries and stable isotopes clearly points to a dietary shift. With regards to diet, there appears to be a relatively strong differentiation between town and country. This is most likely related to differences the availability of market products. The urban diet appears to have been more diverse, composed of more sugars and starches as well as different types of proteins in comparison with the rural diet. Once more, as was suggested by the discussion on disease and stress, the dietary data suggest that the rural living environment is not better than the urban one or vice-versa. Clearly, different food products in different proportions were consumed, but both diets appear to have been able to meet nutritional needs.

7.3 MAIN RESEARCH QUESTION

- In which ways do human skeletal remains reflect key socioeconomic developments in the medieval period in Holland and Zeeland, and how do the results contribute to a better understanding of the impact of these developments?

The human skeletal remains offered unique direct data on the physical effects of the socioeconomic developments in the medieval period. Differences in disease, activity, and diet which can be linked to social or economic processes in the medieval period are clearly discernible when the skeletal collections are compared. However, although there are differences, what stands out in this research is the absence of a marked distinction between town and country. The variations that were observed in disease, activity, and diet were not so outspoken that they fully support the idea that on the eve of modernity, towns and villages in Holland and Zeeland had become worlds apart. Especially in terms of disease, this research has shown that a more nuanced image is necessary. The popular image of the town as a horrible place compared to the idyllic countryside is not reflected by the people from Blokhuizen, Klaaskinderkerke, and Alkmaar. The rural environment appears to have created challenges to physical well-being, just like the urban environment, though slightly different in nature.

The combination of osteoarchaeological information with historical contextual data has provided a more detailed, accurate image of the influence of change and development on populations. In doing this, this study has clearly demonstrated the power of multidisciplinary research. In sum, this research has provided new data on individual residents in medieval Holland and Zeeland and used this information to assess the physical impact of socioeconomic developments in this period, thereby providing multifaceted high-resolution data for a more complete understanding of lives in transition.
7.4 FUTURE RESEARCH DIRECTIONS

This research has demonstrated the effectiveness of osteoarchaeological methods for evaluating the impact of socioeconomic developments in the medieval period. However, some individual aspects of this research raised new questions that merit a more detailed analysis and the application of different methods. Furthermore, to extend this type of research in the future to gain even more insight in this period, additional questions should be asked and more collections consulted. First, a discussion on how the current results can be enhanced is presented, after which suggestions for expansion of this research are discussed.

7.4.1 Boosting the current results

The high cribra orbitalia prevalence in the skeletal collections from the countryside is hypothesised to have been due to malaria. However, since the orbital lesions are not pathognomonic for malaria infection, this hypothesis cannot be confirmed on the basis of macroscopic analysis alone. Therefore, it would be particularly useful to study this topic using biomolecular methods such as ancient DNA or proteomics. Some studies focusing on detecting malaria in skeletal remains using DNA techniques have been performed, unfortunately with limited success (e.g., Pinello 2008; Salares et al. 2004). This may be due to the methods that were used in the past. Recently, new DNA techniques have been developed which may improve the detectability of the ancient pathogen in human bones (Kobolt et al. 2013). Additionally, analysis of human dental calculus has shown to have great potential for the analysis of disease in past populations (Warinner et al. 2015), which may also be of use in the search for malaria parasites. The development of these new techniques to allow the detection of malaria in ancient remains can provide solid evidence for the hypothesis formulated here, and would contribute to a better understanding of this disease and its impact on past populations around the world.

Similar techniques could be used to diagnose tuberculosis, bovine and human, and brucellosis in skeletal remains. As was briefly touched upon in chapter three and six, ancient DNA research into these diseases has proven to be extremely valuable in archaeology (e.g., Mays et al. 2001). In this dissertation, diseases were diagnosed on the basis of macroscopic evidence alone, and, consequently, most likely present an underestimation of the true prevalence. Future research could benefit from the inclusion of biomolecular methods for the identification of disease in the skeletal collections.

This current research has chosen to focus on osteoarthritis and lower limb morphology in order to study activity patterns. While this approach revealed interesting patterns, more methods and techniques could be employed for further study to expand and further solidify
data on activity in medieval populations. The bone morphology of the other limbs, such as the arms and clavicle, could be included in the future studies to gain broader insights into the activity patterns of the rural and urban individuals (e.g., Inskip 2013; Wanner et al. 2007), possibly with the help of CT imaging (Stock and Pfeiffer 2001). Additionally, the study of enthesal changes could help understanding the type of activities and level of muscle strain in a better way (e.g., Henderson et al. 2013; Vilotte and Knüsel 2013).

7.4.2 Thinking big: future questions and ideas

This research could benefit a great deal from the inclusion of more skeletal collections. Although this study included three collections representative of the period, more data could enhance the results. For example, comparisons with larger and more densely populated towns could increase the understanding of life in the urban environment. Furthermore, comparisons outside Holland and Zeeland, with, for example, towns in the south and east of The Netherlands, may provide new insights into the consequences of socioeconomic developments in the medieval period in the whole of the country.

While this research focused on the medieval period, broadening of the time frame to create a wide diachronic sample could give very interesting results. By including skeletal collections from later and earlier time periods, a more chronologically complete and detailed image can be gained. In England, Lewis (1999) compared skeletons from the industrial period with those from earlier periods in order to study the impact of industrialisation on people. Since this research has demonstrated differences between the present study and research form the UK, this line of investigation is necessary in Dutch research as well.

This research has shown the effectiveness of using osteoarchaeology to study large developments in society. An increase of this type research in Europe could substantially enhance the image we have of life through the ages, both on a region specific as well as on differences between areas. The combination of historical data with skeletal information has proven to be instrumental in obtaining a better understanding of these medieval transitions, marking this approach as essential for future research.