Summary

Life in transition. An osteoarchaeological perspective of the consequences of medieval socioeconomic developments in Holland and Zeeland (AD 1000-1600)

This research investigates the impact of socioeconomic developments on the physical condition of medieval populations in Holland and Zeeland between AD 1000 and 1600 through the analysis of human skeletal remains from three archaeological sites. In a relatively brief period of time, this region went from being scarcely populated to an area characterised by expanding urban centres and flourishing trade systems. These large scale developments had an impact on the daily lives of medieval people. Living environment and social conditions changed drastically for both rural communities and the residents of the new towns. While these socioeconomic developments of the medieval period in Holland and Zeeland, such as higher population density in the town, commercialisation of agriculture, and the expansion of international trade, have been studied in detail from a broad historical perspective, there is a paucity of data concerning the impact of these developments on the people themselves. Hence, this research proposes a different approach to this subject which allows a detailed examination of the physical consequences of medieval developments in Holland and Zeeland by investigating the process from an osteoarchaeological perspective on the level of the individual human body. The potential physical influences of socioeconomic changes to lifeways are studied on the basis of three themes, disease, activity, and diet.

Individuals from two rural and one urban skeletal collections are analysed. Since the land reclamation village of Blokhuizen (AD 1000-1200) in Holland predates urban development in the area, its inhabitants can serve as a rural baseline to which the other skeletal assemblages can be compared. This small farming village on the peat was mainly engaged with arable farming and to a lesser extent with pastoral farming. A total of 119 individuals from the Blokhuizen site were included in this research. The second skeletal assemblage is associated with the rural village of Klaaskinderkerke in Zeeland, dating to the late medieval period (AD 1286-1573), when urbanisation was well on its way. This collection of 54 individuals
provides the rural perspective during this time. The 189 individuals excavated at the Franciscan friary in the town of Alkmaar (AD 1448-1572) provide the urban perspective. This medium-sized town in the county of Holland had about 9,000 inhabitants in the late medieval period with a fairly high population density, allowing for a proper investigation into the effects of urban life. By comparing the osteoarchaeological data from these three rural and urban populations, it is possible to gain a better understanding of the potential physical consequences of the socioeconomic developments for medieval people.

Several skeletal indicators reflecting aspects of past disease, activity, and diet are studied to investigate possible physical changes. Firstly, the prevalence of two specific infectious diseases affecting the skeleton, brucellosis and tuberculosis, is researched. Tuberculosis, a chronic lung infection, is a disease commonly associated with poverty, malnutrition, and overcrowding, and therefore often related to urbanisation. Research focused on other medieval European towns has shown that the prevalence of this disease tends to increase as a result of urban living conditions. Brucellosis, on the other hand, is a chronic infection that is spread through infected aerosols, handling of infected blood, or consumption of infected raw meat or milk. It is therefore more likely to occur in a rural area where residents proportionately had more direct contact with cattle.

Changes in the medieval activity patterns are examined through osteoarthritis prevalence and differences in bone morphology. Osteoarthritis is a joint disease that causes a decrease of cartilage, with different bony responses as a result. Although many factors may contribute to this disease, such as genetics, body weight, and living conditions, mechanical stress is one of the most important determinants. Alterations in bone morphology can also be seen in response to certain changes to activity patterns. This study examined the femur and tibia, with flatter bones suggesting higher activity and especially higher mobility levels. By comparing bone morphology and the prevalence and location of osteoarthritis between the skeleton populations, it is possible to determine whether the activity patterns have changed over the time, potentially as a result of urban living.

Shifts in the diet of medieval communities are studied by analysing the prevalence of carious lesions and certain skeletal markers of nutritional deficiencies. Caries, or tooth decay, is often related to diet in archaeological studies. In many areas of the world, an increase in caries prevalence was noted when diet became more carbohydrate rich. This is related to the fact that the oral bacteria which cause dental caries flourish in the presence of carbohydrates. Therefore, a higher percentage of caries points to an increased intake of products containing sugars and/or starches. In addition, the signs of specific vitamin deficiencies, such as the skeletal changes caused by vitamin C and D, can provide a better understanding of the nutritional value of the diet. The comparison of the frequency of
dental caries as well as the prevalence of vitamin deficiencies between the three skeletal collections offers the opportunity to investigate changes in dietary patterns.

Additionally, non-specific skeletal stress indicators are studied. These are bony reactions which suggest that the individual experienced some form of stress, such as episodes of disease or malnutrition, at some point during their life. However, the exact cause of this stressor cannot be determined. In the current study, growth delays, enamel hypoplasia, and cribra orbitalia/porotic hyperostosis are analysed. Health problems in childhood can lead to growth stunting, which can result in a shorter adult stature. Therefore, the average adult body height of the populations is compared to determine whether the developments in the Middle Ages impacted growth. Enamel hypoplasia, small localised bands/pits with less enamel on the teeth, indicate that there was a period of stress at the time when that particular tooth was formed. Cribra orbitalia and porotic hyperostosis, porosity in the eye sockets and on the cranial vault respectively, are often related to anaemia, but also vitamin deficiencies may be responsible for this. By comparing the prevalence of enamel hypoplasia and cribra orbitalia/porotic hyperostosis between populations, the level of systemic stress can be studied and it can be assessed whether the socioeconomic developments have impacted the levels of stress in the daily levels of medieval people.

The results of the skeletal analysis of the three collections revealed that there are differences between the populations. With regards to disease it is striking that tuberculosis and evidence for other, 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 been an important factor in the apparent increase in respiratory disorders. Interestingly, however, the indicators of non-specific stress are not significantly increased in the urban skeletal collection. In fact, cribra orbitalia prevalence is 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. 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.

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 comparisons of men and women as well as that of specific joint groups reveal significant differences indicating a shift
in the types of physical activity for both men and women. The women from Blokhuizen exhibit significantly more osteoarthritis in the joints of the upper extremity (shoulder, elbow, wrist and hand) than women from the other populations. The urban women in particular have a significantly lower prevalence of osteoarthritis. Although less pronounced, differences are also apparent when the men from the different populations are compared with each other. The observed variations in mechanical loading can be the result of the decline in agriculture in the late medieval period. During this period rural populations were strongly focused on production for the market, which resulted in decreased agricultural activities. In contrast, employment grew in the commercial fishery, textile trade, and breweries. For urban individuals agricultural activities were unusual. Both men and women worked in the urban industries and performed specialised activities. Significant changes were also observed with regards to bone morphology suggesting changes to mobility levels. 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.

Dietary patterns also appear to have changed over time and as a result of urban living. The individuals in Alkmaar have a higher prevalence of dental caries, suggesting that the urban diet contained larger amounts of sugars and starches. This difference can be explained by the diversification and expansion of the market in the late medieval period. Residents of Alkmaar were more dependent on the market than the villagers. Although the late medieval rural populations had access to the market as well, they were still able to grow products for own use which may have limited there consumption of market products. This may explain the large differences between Klaaskinderkerke and Alkmaar. Although the diet was clearly different, the lack of evidence for nutritional deficiencies suggest that the rural and urban diet were adequate in terms of nutritional value. The complementary master study of Hattum focusing on the differences in food pattern between Blokhuizen and Alkmaar based on stable isotopes (carbon and nitrogen) shows interesting results. While the caries frequency indicates a marked increase in carbohydrates for the urban dwellers, the isotopic research suggests that the inhabitants of Alkmaar consumed other proteins than the villagers. The higher δ15N values of the urban citizens show that they probably ate more fish than the people of Blokhuizen. This increase in fish consumption can be related to the commercialisation of fishing in Holland and Zeeland during the late medieval period. In addition, the isotopic study shows that the diet of urban residents was more diverse than the diet of the rural population which is consistent with the idea that people in the town were dependent on the market for food.
Although differences are observed between the different skeletal collections, the key finding of this research is the absence of a marked distinction between town and country. The variations that were observed in disease, activity, and diet do not fully support the traditional 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 view 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 and urban environment each created challenges to the physical well-being of individuals, albeit 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.