A pathological truth: The truths skeletons show about care in Early modern Arnhem using the principles of the bioarchaeology of care

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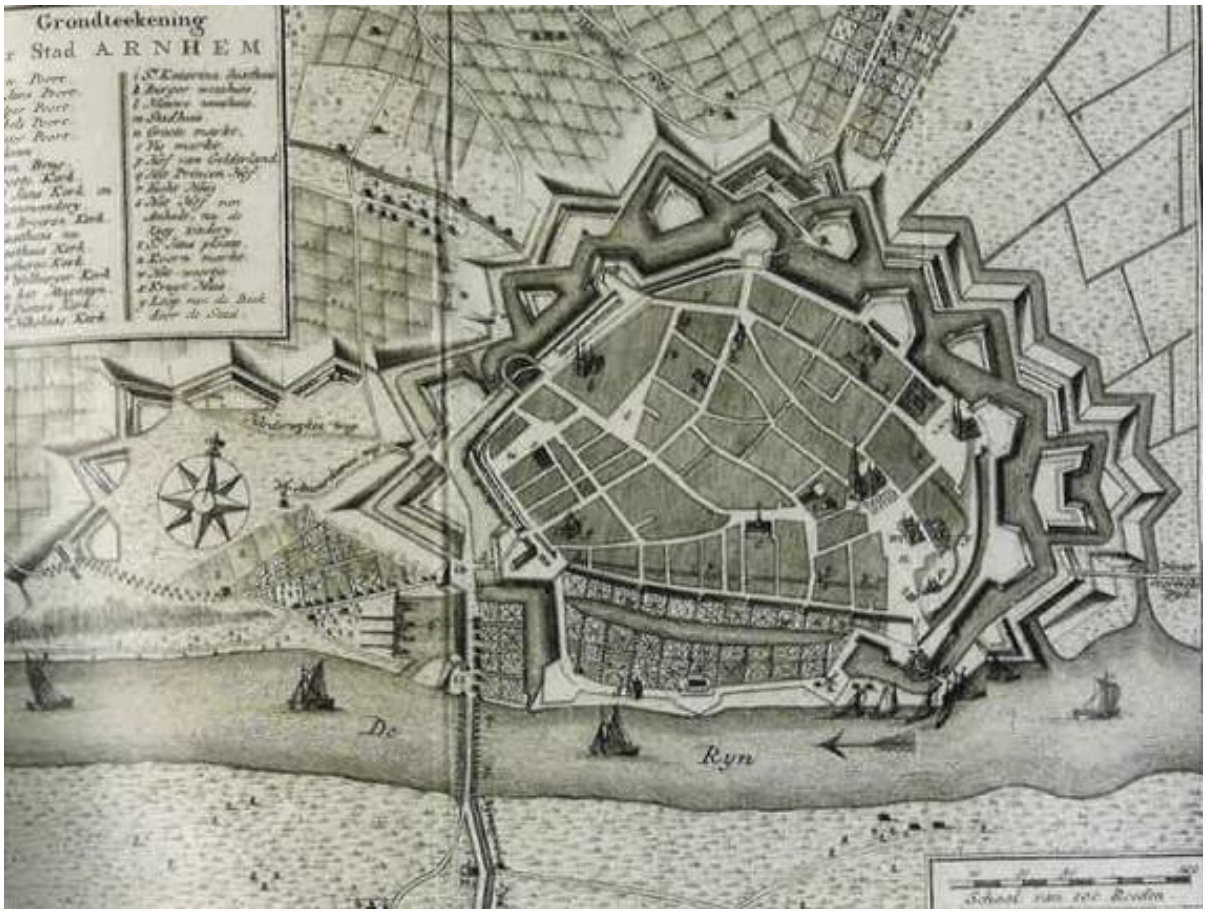

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Cover image: Drawing of Arnhem in the 1700s created by Jan Wagenaar. Photo by Valentijn Paquay. (Paquay, 2021, p. 129)

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Chapter 1: Introduction

In the early modern period, people fell ill and got disabled, some got better overtime, others did not heal from their disability, but lived on being supported by their relatives at home (Wintle, 2000, p. 42), their way of survival was based on care. The church and the local government in and around Arnhem made efforts to care for those who could no longer care for themselves because of their disability. Several institutes such as guesthouses (Paquay, 2021, p. 29) or civic hospitals (Israel, 1997, p.69), comparable to today's nursing homes, were established to take these people in and to care for these individuals. When an individual was brought to the hospital in the post-medieval era, it meant that the individual would most likely die in the near future (Wintle, 2000, p. 42). The church was involved in charity (Grell, 1997, p. 49), and in the city market one could probably find an apothecary or physician that would provide patients with medical care (Deneweth & Wallis, 2016, p. 548). Historically, a lot can be said about care in the past and what institutes there were for care provision, especially on care for the general community. However, little attention is being paid to how care was organised in a practical sense, or what care looked like for the individual who received it. Additionally, it is not clear to what extent the lower classes of society received care, as they may not have been able to pay for certain services.

1.1 Research Problem

Unfortunately, in the field of (bio-)archaeology little attention is paid to care from the past (Tilley, 2015, p.27). Archaeologists often tend to focus on the demographic traits, this includes sex, age-at-death and stature (Tilley, 2015, p. 27). Less often pathology is studied (Tilley, 2015, p. 27) but pathological lesion found on skeletons, can help bio-archaeologists determine what kind of injuries or disease the individual suffered from (Tilley, 2015, p. 27). Information on the pathology and disability can then help provide a view on the care that the individual might have needed to survive (Tilley, 2015, p. 27).

There are a number of reasons why studying care might be relevant for archaeologists. It allows us to study if and how care was given and it might help us understand if there was any differentiation between people who received care (or perhaps did not receive care). It might even help us see if there was any correlation between status and the quality and amount of care given to an individual (Halcrow, 2017, p.1102). Additionally gaining knowledge in understanding care

of the past can help us understand how past societies generally dealt with disabilities and disease (Tilley & Schrenk, 2017, p.318) and what a society's morals and values were like (Tilley, 2015, p. 45). This is what this thesis will do by applying a new approach, that has developed quite recently (Halcrow, 2017, p. 1101).

This approach, known as the bioarchaeology of care, aims to study the care that was given to individuals in the past (Halcrow, 2017, p. 1101). This approach was initiated because it has been understood that in numerous cases the archaeological record shows that people in the past must have needed some type of care to be able to survive, but that there had no research been done on what this care might have entailed (Tilley, 2015, p.14). From this consciousness in the area of the bioarchaeology of care, a method has been developed to research care on a case study basis, in a logical and accessible way (Tilley, 2015, p. 15). By applying this approach to several individuals with very visible and debilitating pathological conditions from early modern Arnhem, this thesis hopes to shed light on care in the past.

1.2 Research Questions

For the purpose of my thesis I would like to shed light on care in the past by researching the following main question: How were individuals with visual and severe disabilities cared for in early modern Arnhem?

I will do this by combining literature and osteological/bioarchaeological analysis. The following sub questions will be discussed to help answer the main question.

1. What does pathology say about the living conditions and quality of life of these individuals?
2. What could care have looked like for the Arnhem individuals?
3. What does this say about the Arnhem population and their attitude towards disability and disease?

1.3 Approach

To answer the main and sub questions I have chosen to use certain materials and a rather new method. Firstly, I would like to introduce the Index of Care, which is a method developed in the area of the bioarchaeology of care, which I will apply for my research. The aim of this method is to find out how care was organised for a particular individual, whose skeleton is still preserved (Tilley, 2015, p. 153), and what this given care means for the individual and the community from

which this individual was part of (Tilley & Cameron, 2014, p.7). This method fits the research aims as it allows to research how care was organised in a practical sense for the individual, which adds a dimension to the historic image of care, which I have sketched earlier, which mostly focuses on the great picture.

For the materials, I will use three skeletons from the graveyard near the St. Eusebius church in Arnhem, that show severe pathological lesion. The skeletons are dated from 1650 – 1829 (Zielman & Baetsen, 2020, p. 1136 - 42), and they are preserved well. It is believed that these individuals most likely belonged to the lower classes of Arnhem's society (Zielman & Baetsen, 2020, p.688).

1.4 Thesis Outline

In the following chapter, chapter 2, I will provide a background on care as it was organised in the early modern period, also specifically focused on Arnhem. Additionally, I will explain the approach and the background of the bioarchaeology of care.

In my third chapter I will discuss the materials that I have used to conduct the research for my thesis on. I will give information about the skeletal material used and describe their provenance. Here, I will also explain the method that I have used, which is the Index of Care and I will explain how I applied this method during the research.

The fourth chapter will present the results of the initial osteological analysis. Here I will discuss what pathological lesions are visible on the skeletons, I will also shortly describe what injuries or disease might be associated with these. I will describe what the conditions and life quality of the individuals looked like in regards to their lesion, focusing on clinical symptoms and functional impacts. Lastly, I will provide a model of care, in which I describe the care that the individual most likely needed.

In the fifth chapter, where the discussion can be found, I will discuss the results and what the outcomes of my results mean for the individuals that are discussed and for early modern Arnhem as a community. I will additionally reflect on the method I have used.

In the final chapter, the conclusion, I will summarise all the sub questions, data and results gathered in the thesis writing process. I will focus on answering the main questions , hopefully giving the reader a more complete view on what care might have looked like in early modern

Arnhem. Finally, I will provide the reader with some insights in what further research in the future might look like with this new approach of the Bioarchaeology of care at our disposal.

Chapter 2: Background

In this chapter I will discuss the background for my research, which will focus on the current available information on care practices in the Early Modern period and also specifically for Arnhem and the province of Gelre or Guelders. In today's society, there are many facilities for people to exploit when they suffer from disease or disability, from physiotherapist to surgery's and from rehabilitation centres to nursing homes. As will be presented in this chapter, a variety of institutes were available for the early modern society to receive the needed care, but it is not comparable to our contemporary standards of care, it is neither comparable to the quantity and diversity of care provisioners of today. Presumably, most people did not visit a doctor or hospital when they were in pain or sick, in the following paragraphs several early modern care facilities will be presented, even means that must have been accessible for the poor, lower classes of society.

2.1 Care in the Early modern period

Initially it must be mentioned that home, was for most people the first and most important place to receive care when needed, most likely provided by relatives (Wintle, 2000, p. 42). Nurses also took care of the sick and disabled, their tasks could have been anything from washing bed ridden people to doing the laundry of those that could not do it themselves anymore (Fissel, 2008, 13). It is even known that people who could not afford a nurse could have one, paid by the parish, to care for them or to do domestic chores (Fissel, 2008, p.13). Even though the church's objective was to assist in the mission to help man's soul acquire salvation, and the institute was therefore mainly focused on spiritual care through prayers and masses (Grell, 1997, p.48), as described above it was also known to be involved in forms of physical care (Grell, 1997, p. 47). Through charity and a poor relief system the church would support those who believed and were involuntary unable to fully provide for themselves (Grell, 1997, p. 49), especially the protestant church saw this as a civic duty towards the community (Grell, 1997, p. 49). Poor relief was in many cities also organised by the local government that provided money for people that were unable to make a living due to sickness, disability or elderdom, about 10% percent of the population received aidance from these types of charitable funds (Nederveen Meerkerk & Teeuwen, 2013, p. 86). The early modern period knew hospitals, but these had a different function compared to today's hospitals (Wintle, 2000, p. 42). The hospital functioned as a place

where people were only admitted if they were severely sick or disabled and close to death, if they were not able to care for themselves anymore and if their familiars and relatives could no longer care for them (Wintle, 2000, p. 42). *Tuchthuizen* or civic hospitals, which differed from the hospitals I mentioned before, were also established from the 16th century onwards, in these institutes the disabled and sick people of the poorer classes were cared for, these *tuchthuizen*, were not affiliated with the church but were initiated by the local governments, such as city councils (Israel, 1997, p.69).

As illustrated above a variety of care facilities were known during the early modern period, but more specifically health care or medical care are also manner of care giving. In the 17th century, the Netherlands held an exemplary position in the field of medicine (Israel, 1997, p. 68) as a on the Dutch universities medical methods and medicine with a basis in chemistry and physics were studied (Israel, 1997, p. 73). In the low lands hygiene and cleanliness were common practice (Israel, 1997, p. 73). In some Dutch cities it was even a custom to have a board existing of physicians and apothecaries to visit and inspect the operating pharmacies and surgeons to maintain a high standard of health care and to eradicate medical charlatans (Israel, 1997, p. 75). Lastly, people who could not afford housing or who were too old and too sick or disabled to work were often housed (Israel, 1997, p.69), as from the early modern period onwards, civic welfare became an important matter throughout the Netherlands, foreigners would be surprised about the fact that there were no beggars on the Dutch streets (Israel, 1997, p.69).

In the following paragraph a few care facilities from specifically Arnhem and its surrounding areas will be provided.

2.1.1 Care in and around Arnhem

In and around Arnhem different facilities were operating to provide people with care. One type of facility that seems to dominate this purpose is the *gasthuis* or guesthouse (Paquay, 2021, p. 29), these functioned partly as a shelter for people who were homeless and trustworthy, but they also functioned as nursing homes, were people who could no longer care for themselves could stay (Paquay, 2021, p.53). These guesthouses were often established by a guild consisting of nuns or monks who used their own money, that of the church and that of donors to construct their institutes (Paquay, 2021, p.53). A variety of people were cared for in these institutes, elderly people, people who suffered from disability or the plague (Paquay, 2021, p.149), wounded

soldiers (Paquay, 2021, p.135), homeless people (Paquay, 2021, p.149). It is even known that in the early modern period, older people who could financially afford it, but were not able to fully support themselves physically could pay the guesthouse to stay and be cared for in the guesthouse until their death (Paquay, 2021, p. 145). It was not unusual for the guesthouses to have their own graveyard where they would bury their staff and former residents (see Landschap en Historie, www.veluwezoominbeeld.nl). However the skeletons that were analysed for this research were excavated from a graveyard near a church so they did most presumably not die in a guesthouse. Two well-known guesthouses were the *Nicolaasgasthuis* or Nicolaasguesthouse (Paquay, 2021, p. 29) and the St. Catharinae guesthouse (see Landschap en Historie, www.veluwezoominbeeld.nl). Arnhem also housed a guesthouse, the Anthonisgasthuis, where people who suffered from Syphilis or leprosy were housed as these people were in some cases cast out by their community because these diseases were highly contaminable (Paquay, 2021, p. 57). In terms of medical care, apothecaries were most dominantly in operation around Arnhem, these apothecaries provided people with medical counselling and they would also medically care for patients (Deneweth & Wallis, 2016, p. 548). But these services had to be paid for, so only people who could afford going to the apothecary would use this services, even though it was possible to go to the apothecary and pay for the services at a later moment (Deneweth & Wallis, 2016, p. 542). Even though paying by credit was a possibility, medical care remains a small segment of care as it was little sought out by people (Deneweth & Wallis, 2016, p. 547). On top of that, some people might not have been aware of the severity of the illness they were suffering from or they were perhaps not even aware they were sick (Deneweth and Wallis, 2016, p. 536). Another possibility is that the suffering people just accepted their faith (Deneweth & Wallis, 2016, p. 536). Thus, it is important to take in account the individual's agency.

Fig 2.1: Painting by Johannes Weissenbruch of the Beekstraat, the white building in the middle is the Catharina guesthouse. Picture by Valentijn Paquay (Paquay, 2021, p. 56)

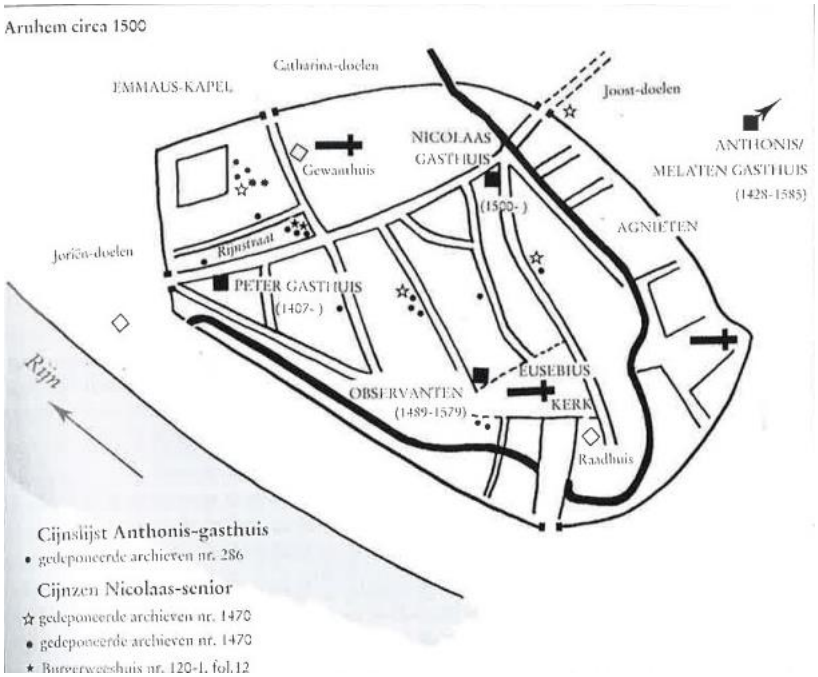

Fig 2.2: Map of Arnhem in 1500 in which you can see the location from the several guesthouses mentioned in the chapter. Picture by Valentijn Paquay. (Paquay, 2021, p. 23)

2.3 The bioarchaeology of care, a new approach

There is a clear general image of what care could have looked like for people in the early modern period, however this does not provide the answer to what care looked on the level of the individual. This gap of information can be filled by using the bioarchaeology of care. The bioarchaeology of care is an area of study within bioarchaeology, developed quite recently, that has been receiving more interest and attention in the last couple of years (Halcrow, 2017, p. 1101). When dealing with human remains in the form of skeletal material or mummies, archaeologists and osteoarchaeologists are known to be rather occupied researching demographic characteristics (Tilley, 2015, p. 48), this means the focus of researchers lies mostly on determining the individual's sex and age-at-death. In a few cases, attention is paid to visible lesion or pathology found on human remains (Tilley, 2015, p.27). By studying this pathology, diseases, disabilities or injuries the individual suffered from can be uncovered, almost like a medical diagnosis (Tilley, 2015, p.27). Sadly, no or very little attention is paid to how the person was cared for during their lives for them to be able to live with their disease or extreme lesion (Tilley, 2015, p.27). The bioarchaeology of care was introduced by Dr. Lorna Tilley (Schrenk, 2019, p.7), who graduated in psychology before she pursued a career in archaeology (Tilley, 2015, p.1). The bioarchaeology of care seeks to fill the gap of knowledge on how people were cared for to survive with their disabilities, diseases and lesion that did not result in death immediately (Tilley, 2015, p. 1). It is about studying a human behaviour, namely care-giving, which is as old as disease and as old as us (Tilley, 2015, p.1). Tilley indicates that humans are capable to endure and survive a lot of physical and psychological disturbances, but that in severe cases people might have received different forms of care or support in their daily lives (Tilley, 2015, p.37), in order to help them recover from trauma or to help these individuals survive (Tilley, 2015, p. 1).

According to Tilley there are several cases, even from deep prehistoric times or cases related to our Homo *erectus* relatives, where disabled hominins survived for long periods of time with severe illness, suggesting that some form of care was provided allowing the individual to live (Tilley, 2015, p. 15). One of the first case studies that has been looked into with an approach to care is the case of M9, an individual who lived about 3700 to 4000 years ago in what is now known as Northern Vietnam (Tilley & Oxenham, 2011, p. 35). This person who was only between the age of 20 and 30 years old at time of death. was estimated to have been cared for, for

at least 10 years, as he might have suffered from several debilitating bone diseases, such as fusion of the joints and Klippel Feil Syndrome type III, which would have caused this individuals to have to deal with numerous disabilities (Tilley & Oxenham, 2011, p. 37). For this individual the disabilities were made explicit, and a model of care was created that most likely was applied to help this person, taking in regards the social, medical and natural resources of the relevant space and time (Tilley & Oxenham, 2011, p. 38). Conducting the analysis and research on this particular case study yielded information not only about the type of care that was given to individuals within the social culture M9 lived in, but it also gives in insight in the values and principles of the individual's community in regards to caring for disabled people within their social environment (Tilley & Oxenham, 2011, p. 39).

In the following chapter I will discuss the methodology that was derived from the bioarchaeology of care that looks at care with an approach that looks similarly to the case of M9. The approach entails a number of steps or stages that will help create an idea of what care looked like for the individual and this also shapes an idea of what the community's perspective is on caregiving and on people with explicit disability or sickness (Tilley & Cameron, 2014, p.8). In the first stage a general idea is sketched about the individual's social and demographic context (Tilley & Cameron, 2014, p.7). For the second stage it is crucial stage to look at the lesion that is visible on the bones of the individual, so the type of injury, disease and the type of disability can be derived from this (Tilley & Cameron, 2014, p.7). The impacts of the sickness and injury are then described, this implies what kind of care the individual would have needed to survive, and as a result a model of care can be made based of this information, in the third stage (Tilley & Cameron, 2014, p.7). In the last step a further interpretation or discussion is held in which the values and norms in regards to harshly disabled people and the providing of care are discussed, based on the data gathered in the previous stages (Tilley & Cameron, 2014, p.7).

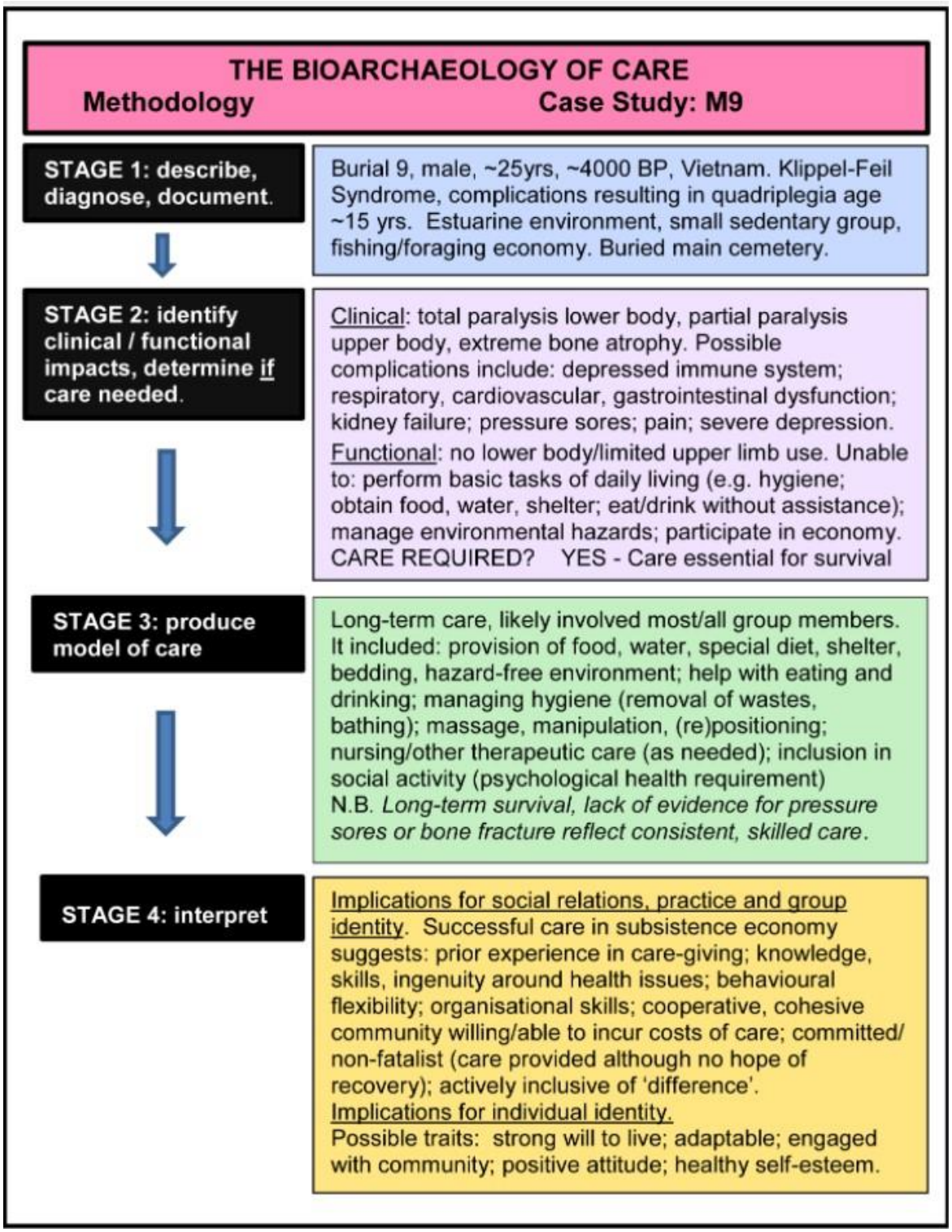

Fig 2.3: Index of Care applied. A prompt overview in a table of how the Index of care works based on data in regards to the M9 individual from Vietnam which was introduced in the background chapter (see About, Background (indexofcare.org)).

Chapter 3: Materials & Methods

In this chapter I will discuss the methods that I will use to research the nature of care in the early modern period. This entails explaining the index of care which is a method that came out of the field of the bioarchaeology of care. Additionally, I will introduce the materials I used, which in my case are three skeletons from Leiden University's Arnhem collection.

3.1 The index of care

The index of care, which is developed by Lorna Tilley (see Background, Background (indexofcare.org) and Tony Cameron (Tilley, 2015, p. IX), is a case-study based method that is qualitative (Tilley, 2015, p. 153) and seeks to understand the care that was given to individuals in the past, in an easy-to-follow way. This web based application enables (bio-)archaeologists to analyse bioarchaeological care through worksheets (Tilley & Cameron, 2014, p. 5). The web based tool provides several benefits as the tool allows information to be displayed and written down in a prompt manner; the use of core concepts and core definitions are applied which ensure the consistency of data; it provides a clear ordering in data and it encourages transparency within reasoning and within results (Tilley & Cameron, 2014, p.6). The index of care entails four different steps or phases in which different aspects are described and analysed. Following these steps will help formulate whether care was needed and what care might have looked like in the past for a specific individual (Tilley & Cameron, 2014, p.6). I will now introduce the four stages that are involved with this method.

In the first stage, the archaeological context of the skeleton as well as a detailed pathological analysis are given (Tilley & Cameron, 2014, p.7). In this step one also takes a look at the possible lifeways of the individual (Tilley, 2015, p. 153). What is additionally done in this step is to look if it is possible to give a diagnosis of the disease the individual suffered from, as far as possible, and to describe any type possible clinical disability or physical/functional impact this might have caused for the individual (Tilley, 2015, p.153). In this step it is really about getting to know the individual and they functioned within their society (Tilley, 2015, p.159)

The second stage consists of two parts (Tilley, 2015, p 161). In the first part the disabilities of the individual are determined based on the lesion and its estimated severity (Tilley & Cameron, 2014, p.7) The regulations maintained in the Index of Care to estimate the symptoms that are related to particular diseases (Tilley, 2015, p. 162).). Severity of the symptoms and how this is

experienced in life are based on protocols created by the World Health Organisation (Tilley, 2015, p. 162).). Here, one also takes a look at the activities in the individual's life that were necessary for survival and in what way these were hindered by the disability (Tilley & Cameron, 2014, p.7). In the second step the impact of the disease and pathology is used to estimate whether the individual was able to care for themselves, and how these individuals functioned within their communities (Tilley, 2015, p. 164). So in this part of step it is also relevant to look at the sociocultural living standards of that person (Tilley, 2015, p. 165); whether they could feed themselves; practice personal hygiene (Tilley, 2015, p.166) ; how mobile they could have been within their own home but also beyond the domestic area; and whether they were capable to perform tasks for their community or partake in necessary communal activities (Tilley, 2015, p.166). By focusing on all these aspects one can argue whether the individual was in need of care by their community or not for them to reach their age-at-death (Tilley, 2015, p. 164; Tilley & Cameron, 2014, p.7).

If the person in question indeed would have needed care, the next step is to investigate what kind of care the person needed, what this care entailed, how long this care was needed and what kind of resources were needed to provide this care (Tilley & Cameron, 2014, p.7). This is done in the third phase, where a model of care is created for the individual (Tilley, 2015, p. 169) in this model the nature of the care-given and the duration of this is described too (Tilley, 2015, p. 169). The two main categories of care an individual might have received are known as "accommodation" and the second category is known as "direct support" (Tilley, 2015, p. 170). In the category of direct support one looks at the (pathological) evidence of treatment for instance by surgery or non-invasive treatment; care might have looked like practically (Tilley, 2015, p. 171) ; and what kind or time, resources and efforts were made by the community to care for the disabled or sick individual (Tilley, 2015, p. 172). Accommodational care is focuses on other aspects, it does not focus necessarily on the functionality of an individual in a community, it rather focuses on how the community has adjusted to make this individual be able to partake within their society structure (Tilley, 2015, p. 172). Based on the results regarding these themes a model of care can be created that is focused on the individual and his/her/their life circumstances (Tilley, 2015, p. 173).

In stage four, which is the last phase of the Index of care and which will only be dealt with if the individual indeed needed care (Tilley 2015, p. 183), another perspective is taken on the care that is given to the individual (Tilley, 2015, p. 178). In this phase the agency of both the treated individual as well as the agency of the community are taken into account, as taking care of an individual and letting yourself be cared for are choices that are consciously made and could therefore reflect the community's values, economy, belief-systems, medical opportunities and also the difficulties in caring and being cared for (Tilley, 2015, p. 178). Subsequently, one could derive a lot of new information and insights from a community when one studies care within a society (Tilley, 2015, p. 179). The lifeways and the agency of a community can also reveal the aims of caregiving within a community: Is care given at all; what type of care is given to the disabled; what can be accomplished with the given-care (Tilley, 2015, 180). As sickness and disability can progress in an individual one could say that the care that is given changes over time as well this could change the aims of care providing as well (Tilley, 2015, p. 180). Additionally also the motivation for care providing in a community is taken in account, people are taken care of, because of emotional or personal reasons, or because it (economically) benefits the community as a whole to take care of certain members (Tilley, 2015, p. 181). However I must say that aims, motivation and agency will be discussed quite generally in this phase as it is impossible to give a nuance, certain perspective on how individuals and communities acted as we are constrained to the Archaeological record (Tilley, 2015, p. 186).

3.2 Appliance of the Index of Care

I applied the Index of Care for my own research in order to say something about the way severe disabled were cared for in early modern Arnhem. I started my research by picking three skeletons from the Arnhem collection that are known to have severe pathological lesion. Three former Master students had already fully described the age-at-death, sex, stature and the pathology for these skeletons. I read through these skeletal analysis' and summarised the most relevant data for my thesis. For the sake of my thesis it was very important to focus on the described pathology, which is in accordance with stage one of the Index of care. I picked three days on which I would analyse the pathology and take pictures, this was done for one individual per day. I obtained the

box the in which the skeleton was stored from the storage room and I laid out the skeleton in an anatomically correct way, I then spent time looking at the most heavy lesion, so I could see it for myself. I also took pictures from the important pathology. After I was done analysing the skeletal remains I added, where necessary, observations of my own. The diseases that are linked to the pathology in the skeleton were in most cases already defined, I used these defined diseases to find literature on the clinical and functional impacts of the disease on the individual and I described this in the results chapter, this is in line with stage two. Based on the clinical and functional impacts, if care was needed, a model of care was created in which the care and the duration of this care is described based on the impacts of the disease and disabilities the individuals most likely suffered from, which honours the third stage. In accordance with stage four the Index of Care, I discuss the agency of the individual and that of the community in regards to care in the discussion chapter, here I will also refer to the city's facilities that provided care, which are abundantly discussed in the background chapter.

3.3 Materials

To meet the aims of this thesis, specific skeletons that show severe pathology were selected as these would allow for research of the diseases and disabilities that are related to the lesion. The impact of the disabilities and diseases will lead to a model of care for the individuals, in which the care is described that the individuals must have needed for survival, this helps to form an image of what care looked like in the past. In agreement with my supervisor I decided to use three skeletons from the Arnhem collection as these skeletons show severe pathological lesion and because these skeletons were very well preserved. All the skeletons that were selected already had their pathology analysed and described, so I myself only took a look at the remains and I took pictures of the different kinds pathology that were visible on the bones.

3.3.1 Historical and excavation context

The skeletons included in this study were excavated from the cemetery on the Northern side of the Eusebius church. About 700 individuals were excavated from this excavation (www.gld.nl) and 551 of these skeletons were loaned to Leiden University's Laboratory of Human Osteoarchaeology (Zielman & Baetsen, 2020, p. 356).

The skeletons come from the Old graveyard (Oude Kerkhof), which was also known as WP10 during the excavation. The location of WP10 is specified in figure 3.2. Most of the burials that

were found and excavated from WP10 are from layer S360, in this layer different depositional materials seem to be mixed, and the skeletons in this layer sometimes showed indications of being disturbed, which indicates that this graveyard has probably been used intensively (Zielman & Baetsen, 2020, p. 84). On the eastern side of WP10 the younger burials of the graveyard could be found dating from the 17th century (Zielman and Baetsen, 2020, p. 666) up till the 19th century (Zielman & Baetsen, 2020, p. 97), the three skeletal individuals that selected for my thesis come from this part of WP10 (Zielman & Baetsen, 2020, p.1136 - 42).

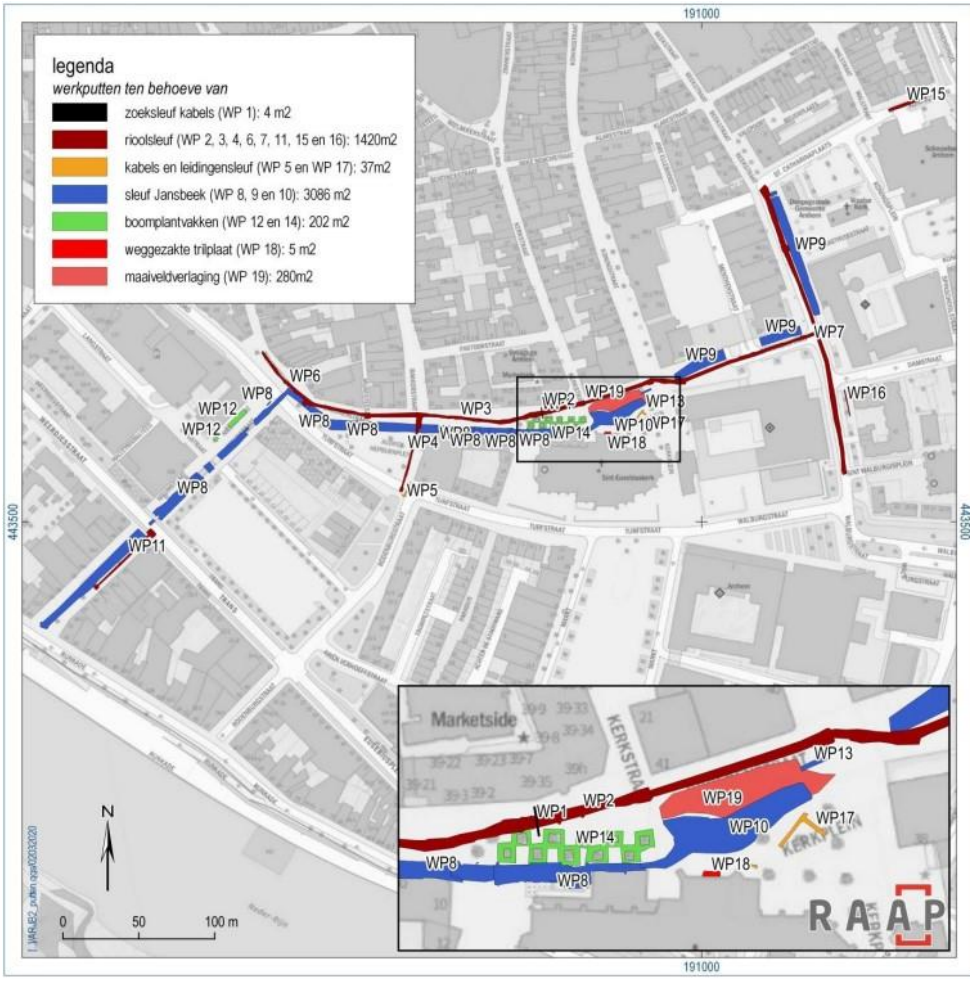

Fig 3.1: Position of WP10 in regards to the St. Eusebius church. WP10 can be found on the northern side of the church and it is coloured blue on the map as it is also part of the St. Jansbeek (Zielman & Baetsen, 2020, p.17).

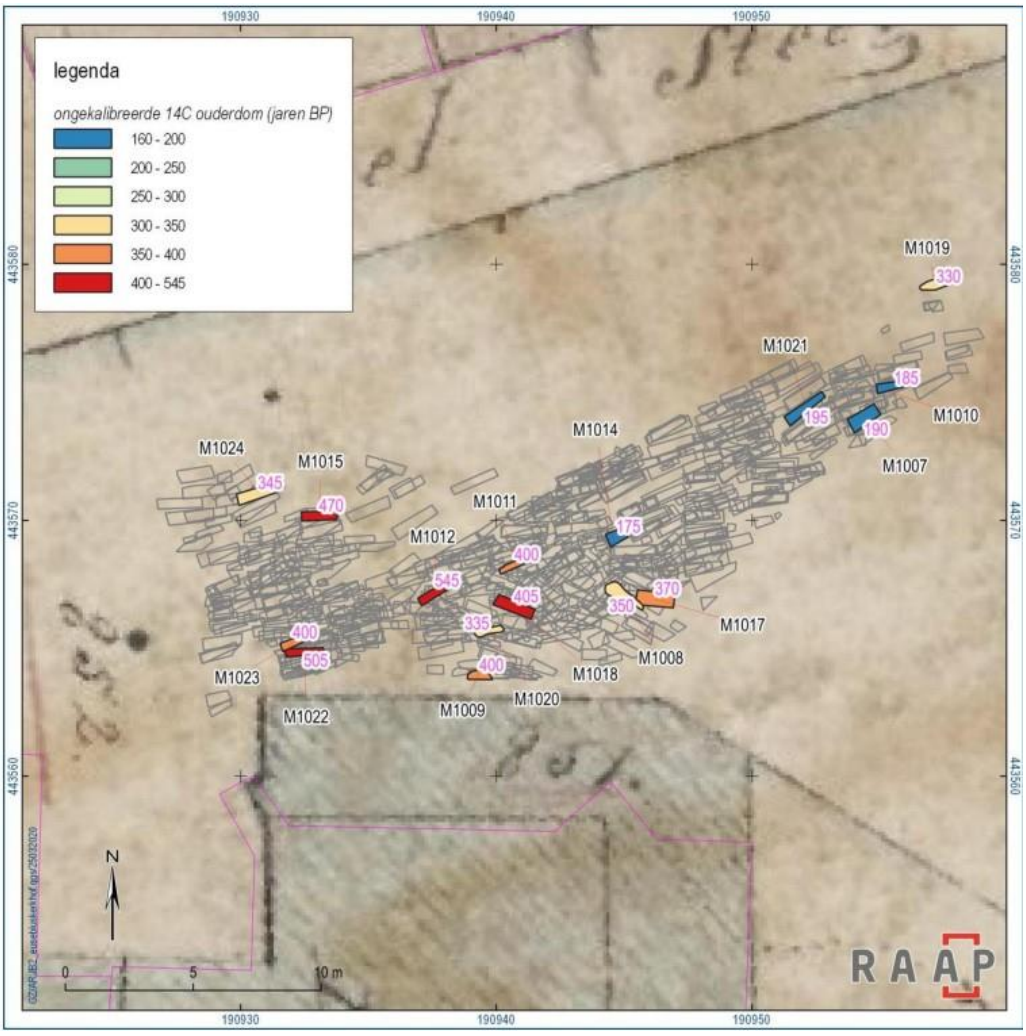

Fig 3.2: Mapped graves in WP10. In this map the graves that are marked in red are the oldest and the graves that are marked in blue are the youngest (Zielman & Baetsen, 2020, p. 97).

The people that were buried on the old graveyard were most likely from the lower classes of society (Zielman & Baetsen, 2020, p.688), there are a couple of indicators that support this claim. A large amount of enamel hypoplasia was found on the teeth of the buried individuals, enamel hypoplasia usually forms when an individual suffers from a lack of nutrients in their younger years (Zielman & Baetsen, 2020, p.688). Another indicator is that a lot of pre-mortem broken bones were found among the individual as well as a great number of cases in which people suffered from osteoarthritis, mainly in the joints in the shoulder girdle, these indicators proof that the individuals were most commonly involved in heavy and/or dangerous labour (Zielman & Baetsen, 2020, p.688). Lastly, a low number of cases of bone deformations were found, which means that people died from infections and diseases before the diseases could affect the bones

(Zielman & Baetsen, 2020, p.688), which is very interesting for my research as this may indicate a low immunity towards certain types of disease (Zielman & Baetsen, 2020, p.688).

Only people of the Christian faith that were baptised were allowed to be buried at the cemetery near the church (Zielman & Baetsen, 2020, p. 106).

The individuals that were selected are V0476 (s358), V0973 (s570) and V1346 (s683). All these individuals sadly suffered from diseases and lesions that are still very well visible in their skeletal remains. The individuals lived and died in the early modern period as these skeletons are all dated between 1650 and 1829 (Zielman & Baetsen, 2020, p. 1136 - 42). All skeletons are preserved well and they can be considered mostly or almost complete, meaning few bones are missing in the skeletons. All individuals are most likely males and they have all reached adult hood in life.

Individuals by find number	Feature number	Trench number	Dating	Sex	Age	Stature
V0476	S358	8	1650 - 1829	Male	50+ (old adult)	161,19 cm
V0973	S570	10	1650 - 1829	Male	36 – 49 (middle aged)	172,74 cm
V1346	S683	10	1650 - 1829	Male	18 – 25 (young adult)	170,86 cm

Table 3.1: Overview of Data on the skeletal individuals (Zielman & Baetsen, 2020, p. 1136 – 42). Age and stature after the skeletal forms.

Chapter 4: Results

This chapter will present the results obtained after the application of the index of care to the three selected individuals. Firstly, I will discuss the most important pathological lesions found on the skeletons and I will aim to explain the diagnosis of the disease or injuries responsible for the bone lesions. Secondly, the functional impairments and clinical implications of the disease will be discussed. And an image of what the individual suffered from will be provided. Lastly, a model of care is produced, in this model of care, a description is provided with the type of care the individual most likely needed.

4.1 Individual V0476

Sex: Male
Age: Old adult, 50+
Stature: 161.19

4.1.1 Description of lesions and diagnosis

Unfortunately, the skeleton of this individual is not fully complete anymore. The lower body, consisting of legs and feet are missing , parts of the cranium, several vertebrae and the right hand are missing as well.

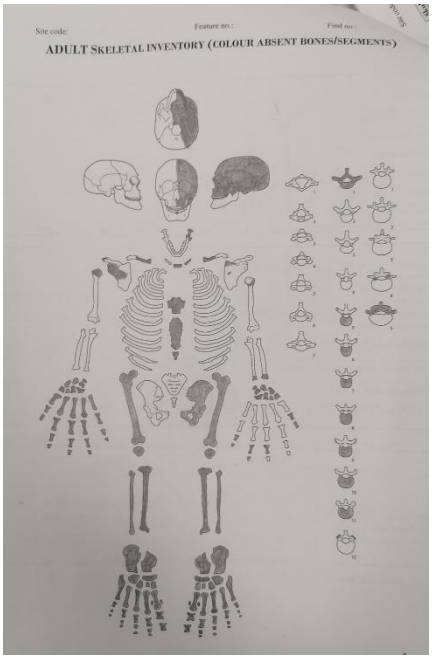

Fig 4.1: Skeletal inventory, every in grey is missing. Form filled in by Tommy Morgan. Picture taken by Author.

Fig 4.2: Skeleton V0476. Picture taken by author.

There are two types of lesions visible in the skeleton. The first type is degenerative lesion, this refers to degeneration of bone as a result of ageing and physical activity which causes the bone to lose its function (see Degeneration definition, www.spine-health.com). and the second type of lesion entail osteoblastic and osteolytic lesion caused by metastasis from prostate cancer. Osteoblastic activity refers to the production or overproduction of new bone (Logothetis & Lin, 2005, p. 21), whereas osteolytic activity refers to the degeneration or destruction of bone (Logothetis & Lin, 2005, p. 21).

A more specific degenerative diseases which is present in the skeleton is, intervertebral disc disease which affects the vertebrae of the individual. This has manifested itself in several forms in the spine of the individual. In the vertebrae from the neck, the cervical vertebrae show for instance the presence of osteophytes, osteophytes are some type of extra bone formation often called bone spurs, here they grow on the bone as the cartilage between the vertebrae had been degenerating (see Osteophytes definition, www.spine-health.com). In these neck vertebrae also eburnation is present, this forms when two bones directly interact with one another, causing friction that polishes the surface of the bone. This happens when cartilage between bone has been degenerated. Additionally on the vertebrae of the back, thoracic vertebrae and on the vertebrae of the lower back, also known as lumbar vertebrae, Schmorl's nodes are found as well as porosity. Schmorl's nodes are imprints on the body of the vertebrae which are caused by the bulging of cartilage into the bone, causing it to form indentations within the body of the vertebrae (see Schmorl's nodes, www.osmosis.org).

Fig 4.3: Lipping on the edges of the vertebrae. Picture taken by author.

Fig 4.4: Porosity and Schmorl's nodes on the Body of the vertebrae as well as lipping on the facets. Picture taken by author.

The second type of lesion, caused by the metastasis from prostate cancer is clearly seen in the sacrum. On the sacrum an extraordinary amount of osteoblastic and osteolytic activity is present causing it the surface to have a fuzzy structure instead of a normal rather smooth structure. On the left and right ala of the sacrum, which are the most upper holes in the sacrum, the surface is completely covered in osteoblastic lesion, which has caused the right ala to completely close. The heavy reaction of the sacrum is most likely caused by prostate cancer because metastasis of this type of malevolent tumor spreads primarily to the bones in the area of the pelvis, such as the sacrum and os coxae (Koeneman et al., 1999, p. 247). Metastasis in the sacrum most likely caused the overproduction of bone in the sacrum as this is a common effect of prostate cancer in the pelvic area (Logothetis & Lin, 2005, p. 21).

Fig 4.5: Anterior view of the sacrum, the right Ala is almost closed up by osteoblastic and osteolytic activity. Picture taken by author.

Fig 4.6: Posterior view of the Sacrum, which is also heaviliy affected abnormal osteblastic and osteolytic activity. Picture taken by author.

The individual most likely suffered from prostate cancer as this is the only type of cancer that causes this amount of osteoblastic and osteolytic lesions in the sacrum (Logothetis & Lin, 2005, p. 21). It is thought that the prostate is the source of the cancer as the sacrum, near the prostate, is heavily covered in bone forming and bone decreasing activity. The pathology present in the vertebrae, especially on the lumbar vertebrae, are a sign of intervertebral disc disease.

In sum this individual likely suffered from:

1. **Prostate cancer**
2. **Degenerative/joint diseases**
   a. **intevertebral disc disease**
   b. **Schmorl's nodes**

4.1.2 Clinical and functional impact on the individual's life

Prostate cancer is the most common form of cancer in middle or older adult men (Herr 1997, p. 207). Research has shown that there are several symptoms of this disease that have an impact on an individual's life. The most common symptoms of this disease are incontinence and impotence. But for many patients, physical pain is also one of the common occurrences alongside with

fatigue and lesser physical activity in individuals with a more advanced stage of prostate cancer (Kornblith *et al.* 1994, p. 2791). Metastatic prostate cancer often causes anemia which makes the individuals more susceptible to infectious diseases (Logothetis & Lin, 2005, p. 21). The overproduction of bone, which is also visible in the sacrum of V0476, can also lead to pain, additionally a spinal cord procession might occur which could lead to paresis (Logothetis & Lin, 2005, p. 21). In patients with prostate cancer in which metastasis in the spine has occurred, the patient only survives for 2 years (Drzymalski et. al., p. 794). V0476 who's sacrum, which is part of the spine, was heavily affected might therefore not have lived for a long duration after the bone lesion occurred. Damage to the spinal cord, can even lead to numbness in the legs, strong pain in the legs and bladder problems (see Spinal Cord Procession, https://www.hopkinsmedicine.org).

The individual would most likely have suffered from fatigue which could have hindered the individual in daily activities. As observed in the previous paragraph impotence is also a result of prostate cancer, which in several cases could lead to psychological distress (Eton & Lepore, 2002, p. 315). The pain which the individual might have endured because of the abnormal osteoblastic and osteolytic activity in the are of the sacrum might have hindered the individual in their daily life as well. If the individual indeed also suffered from a spinal cord procession as observed above, the numbness in the leg might have caused the individual to be immobile, which means that working and running errands would be hindered by this, but it is difficult to say for sure whether this person suffered from a spinal cord procession due to the prostate cancer.

Intervertebral disc disease is strongly associated with pain in the lower back (Sakai & Grad, 2015, p.160), which might cause an individual to become disabled as the pain withholds the individual's spinal cord to function appropriately in daily life. This pain may be caused by inflammation of the disc joints between the vertebrae (Sakai & Grad, 2015, p.160). Additionally, due to the inflammation and pain, the individual develops a high risk of obesity (Sakai & Grad, 2015, p.160).

Would care for survival have been needed based on these results? Yes.

4.1.3 Model of Care

Based on the results of the previous section it has become clear that the individual likely needed care in order to survive. Due to the pain caused by the lesion in the pelvic are and the lesion in

the spine it might have been impossible for the individual to do labour that requires any type of (physical)effort. The fatigue that the person could have suffered from reinforces the probability that the individual was unable to work. This means that this individual must have needed housing, or perhaps was already housed by relatives, as it is possible that the individual was not able to generate an income to pay for their own rent. Another form of long-term care the individual could have been dependent on is personal and hygienical care. It might have been really difficult for the person to bent over due to the inflammation and pain in the lower back and pelvic area, so the individual could have been helped with dressing, washing (the lower body), clipping the nails of the toes or putting on socks or shoes. Due to the inability that might come from the issues in the back, carrying goods or standing for longer periods of time might have been difficult tasks for this individual. So it is possible that the individual received water and foodstuff from other people. Additionally the washing of clothes or sheets might have done by others. Emotional distress and perhaps even depression from the disability or pain could also have influenced the individuals life, there is a chance this individuals was engaged in social interactions by visiting the church, or by being visited by people from the church.

4.2 Individual V0973

Sex: Probable male
Age: Middle aged adult, 36 – 49
Stature: 172.47

4.2.1 Description of lesion and diagnosis

The skeletal remains belong to a person who was a middle aged male adult at time of death. This individual's skeleton is almost fully complete and the preservation of the bones is excellent.

Fig 4.7: Individual V0973. Picture taken by author.

What immediately stands out in this skeleton is the extraordinary curvature in the spine of this individual. This is most likely the result of Congenital Scoliosis, which causes a sideway curvature in the spine, which already develops in fetuses (Arlet et al., 2003, p. 456). During the life of the individual this curvature often worsen (Hedequist & Emans, 2004, p. 266), which often also has an effect on the surrounding organs and bones (Hedequist & Emans, 2004, p. 267). In this individual the curve in the spine has caused several thoracic vertebrae to be partially compressed, another type of lesion that is visible in the vertebrae is that several vertebrae have grown stuck to each other, this means that also at some point the cartilage disk between these vertebrae has been annihilated.

Fig 4.8: Congenital Scoliosis in the back. Picture taken by author

Fig 4.9: Left ribs. Picture taken by author.

The ribs have also been affected by activity in the spine. A number of ribs have grown stuck to the vertebrae, and on top of that, several ribs have been fused together as well. Additionally the ribs show some deformities, as a result of the scoliosis, some of the ribs have been flattened and compressed.

Fig 4.10: Detail of fused ribs. Picture taken by author.

In sum this individual likely suffered from:

1. Congenital scoliosis

4.2.2 Clinical and functional impact on the individual's life

The congenital scoliosis, which is a deformity in the spine already present at the birth of an individual (Arlet et al., 2003, p. 456), caused a progressive curvature in the spine of individual V0973, which as already described above, has had impact on several bones, but this deformity would probably have also had an impact on the person's internal organs (Hedequist & Emans, 2004, p. 269). It is for instance quite common to start developing heart problems such as atrial defect, tetralogy of Fallot and patent ductus arteriosus (Hedequist & Emans, 2004, p. 269).). Also heart rate anomalies might occur within individuals (see Hypoxia and Hypoxemia, www.webmd.com). According to research, about 20% of the people with this abnormality, might also be subjected to urologic anomalies (Hedequist & Emans, 2004, p. 268). As the spine and nerve system are so intertwined, neurological problems could also be present within an individual (Hedequist and Emans, 2004, p. 266).

Other clinical impacts entail that the person's sense of balance might be off because remaining the head and neck tall and straight might have been a struggle (Hedequist & Emans, 2004, p. 269). Additionally the position of the shoulders could have been off, negatively influencing the functionality of the shoulders and the limbs (Hedequist & Emans, 2004, p. 269).

In the case of V0973 the ribs on the right side of the thoracic cage are fused in some places, it is likely that the lungs did not develop or grow in the way they should, this might have caused respiration problems for the individual during their live (Campbell et. al., 2003, p. 399). The fusion of the ribs would also mean that the diaphragm would not be able to move along as well as it should, which means that taking (deep) breaths would presumably be harder for this individual (Campbell et. al., 2003, p. 400). The lower lung capacity (Campbell et. al., 2003, p. 400) would have caused shortness of breath, wheezing and perhaps even cause suffering from a chronic cough and rapid breathing (see Hypoxia and Hypoxemia, www.webmd.com). This means the individual could possibly not perform tasks that require a good stamina such as carrying goods to different floor levels or maybe even walking certain distances. The initial activity might have been a task that the individual perhaps avoided as the person's sense of balance might have been off (Hedequist & Emans, 2004, p. 269). Individuals with scoliosis often also suffer from sleep apnea or hypo apnea (see 5 Practical Tips for Sleeping with Scoliosis, www.sleepopolis.com)

Would care for survival have been needed based on these results? Most likely yes.

4.2.3 Model of care

The congenital scoliosis would possibly have caused a variety of problems with the individuals respiration system. As mentioned above, it is likely that because of this, the individual would not have a lot of stamina. Carrying water or gathering food from Early modern marketplace might have been hard for the individual to accomplish as this requires stamina and a good posture in which one is able to carry and hold things for longer periods of time, so it plausible that other people provided this person with water and food. It is also possible that the person's mobility outside of their home would be limited. Because of the individual's posture, labour might have been an impossible activity for the individual, so this person most likely lived off people that would house and provide food for the individual. The fused ribs and vertebrae might have immobilised the individual partly, which means that the individual most likely was assisted with washing, dressing and maintaining the feet. Additionally, someone would maybe have looked after the individual during the night as the individual might have suffered from sleep apnea or breathing problems during their sleep.

4.3 Individual V1346

Sex: Probable male
Age: Young Adult, 18 – 25
Stature: 170.86 cm

4.3.1 Description of lesion and diagnosis

This individual's remains belonged to a young adult who must have been younger than 30 years of age. The person was about 170 cm tall and the bones are in a good condition. The skeleton is almost fully complete.

Fig. 4.11: Individual V1346. Picture taken by author.

From the twenty-four vertebrae in the human body, excluding the sacrum and the caudal vertebrae, the lower sixteen of the vertebrae from this individual are fused together. In several cervical vertebrae and thoracic vertebrae, osteophytes are present, osteophytes are pieces of excessive bone or bone spurs, alongside the margins of the joints (Klaassen et al., 2011, p. 1). The spinal cord has additionally been impacted by kyphosis, which is a curvature in the spine forward (see Kyphosis, www.mayoclinic.org), and scoliosis, which as mentioned before, entails a sideway curvature within the body (Arlet et al., 2003, p. 456). Almost all of the right ribs are fused to the vertebrae, this also applies to many of the left ribs. This fusion seem to have influenced the curvature of several ribs as many ribs are less curved than they ought to be. The

most likely diagnosis for this lesion in the spine is ankylosing spondylitis. This is a chronic inflammatory disease that affects the spine, often associated with kyphosis and scoliosis (Boonen & Van der Linden, 2006, p. 4-6).

In sum this individual likely suffered from:

1. Ankylosing spondylitis

Fig. 4.12: Fused lumbar vertebrae. Picture taken by author.

Fig. 4.13: Fused vertebrae, scoliosis and ankylosis in the spine. Picture taken by author.

Fig. 4.14: Rib fused to thoracic vertebra. Picture taken by author.

4.3.1 Clinical and functional impact on the individual's life

People who suffer from this condition have to deal with pain, sturdiness in the back and fatigue (see Ankylosing Spondylitis, www.creakyjoints.org). Other complaints that are usually the results from the physical effects are migraines, stress and anxiety and even depression as well (see Ankylosing Spondylitis, www.creakyjoints.org). Bending down from the waist, or from one side to another are difficult movements for people who suffer from this condition (Boonen & Van der Linden, 2006, p. 4), and in the case of V1346, this might indeed have been very hard to accomplish as almost their entire back is fused together, which means there would little mobility in the back of the individual. As mobility is hindered in individuals suffered from this disease, social interactions are also hard to keep up for these people (Boonen & Van der Linden, 2006, p.5), this means there is a chance individual V1346 lived a quite isolated life. The fatigue that is often considered one of the major problems for people with AS, is often caused by poor sleep, as pain in the back keeps people awake at night (Boonen & Van der Linden, 2006, p. 5). The pain, in combination with the fatigue and lesser social interaction are thought to be major causes of depression in individuals suffering from AS (Boonen & Van der Linden, 2006, p. 5). Additionally, people who suffer from AS are known to be more vulnerable to fracture their spinal bones because of the rigidity in the bones and because the bones are often weakened by osteoporosis, which also associated with Ankylosing Spondylitis (Boonen & Van der Linden, 2006, p. 5). Other comorbidities that often arises alongside AS, are respiratory complications, which could be fatal for the individual (Boonen & Van der Linden, 2006, p. 6). Activities such as getting dressed, personal hygiene and housework are difficult tasts for people who suffer from AS (Boonen & Van der Linden, 2006, p. 5). Other difficulties in the life of an individual who suffers from AS are long working days or manual labor (Boonen & Van der Linden, 2006, p. 5). Sitting for too long or standing for longer periods of time are hard tasks for people who suffer from Ankylosis Spondylitis, physical productivity therefore is also about 50% lower than in people who do not have this disease (see Ankylosing Spondylitis, www.creakyjoints.org). The age-at-death of individual V1346 is also remarkably low, judging from this and the conditions they suffered from (from what can be seen on bone), the person must have had difficulties in providing for themselves.

Would care for survival have been needed based on these results? Most likely yes.

4.3.3 Model of care

This individual must have had long term care that provided water, a clean liveable environment and most likely even housing. Because of the stiffness in the back, it must have been hard for the individual to work or do housework chores, or even to bent over to tie their shoes, so for these kind of tasks the individual most likely would have needed help. As almost the individual's back was fused together, the individual most likely was assisted in washing and getting dressed. If adjustments were possible than this person could have had a job, but they would not have been able to perform or work the hours that a normal person would. If this means that the person would have little to no money, then one could also imagine that food was provided for the individual . This person might not have been able to travel far from their home because of the pain the back. Foodstuff or supplies, most likely had to be collected by someone else. A combination of the fatigue and pain might also have caused the individual to live in isolation, perhaps this person was taken along to social gatherings or to the church to be among people and peers.

Chapter 5: Discussion. What does care look like in the Early modern period in Arnhem and what does it say about Arnhem's society?

In the last chapters a lot has been discussed. I introduced the bioarchaeology of care which is an area of interests that looks to into the ways disabled or sick people were cared for in the past (Halcrow, 2017, p. 1101). A methodology that has been developed that helps to research this subject is the Index of Care, which is invented and worked out by Dr. Lorna Tilley (Tilley, 2015, p. IX). This methodology helps (bio-)archaeologists to research care in the past by offering a sequence of four stages that has to be followed to get an answer (Tilley & Cameron, 2014, p.6). I have explained this method thoroughly in the third chapter on materials and methods, in my last chapter I applied and worked out the first three stages. I introduced the skeletal individuals and described the context in which they were found. In chapter four I also discussed the visible pathology that was found on the skeletal materials and I described the disabilities and diseases that can be associated with the types of lesion, identified in the bone. Lastly, I described what the clinical and functional impacts of the disabilities and lesion would be on the individual's life.

The research aim of my thesis is to investigate how people in early modern Arnhem with visual and severe disability were cared for. In chapter 4, where I discuss the results, using The Index of Care, it has been made clear that the individuals who suffered from severe disability should have received various forms of care to be able to survive. The type of care varies from assisting in house chores such as cleaning and cooking to assisting in personal hygiene.

Focusing on these individual's also says something about the community, its ideals, values and the medical facilities that are at the dispose of the people (Tilley, 2015, p. 178). Stage four focusses on the community, of the individual, in this chapter I seek to understand whether the community was willingly to provide care for their disabled and sick lower class society (Tilley, 2015, p. 178). I will do so in this chapter by combining the data I gathered from discussing the outcomes of stage one, two and three and I will also take the facilities in account which I discussed in the background chapter. Last but not least, the agency of both the individual and the community are taken into account within the subject of care (Tilley, 2015, p. 180).

5.1 What does the care provided say about the analysed individuals?

In this section the analysed individuals are shortly described based on the results chapter.

Individual V476 suffered from a metastatic form of prostate cancer and several joint diseases which most likely caused disability and hinderance in the individual's life. This most likely caused a lot of pain, fatigue and discomforts from inflammations in the spine. The individual most likely received many forms of care, the individual was most likely among other services, housed and assisted with keeping up of their personal hygiene. Considering the damage done in the sacrum, the individual must have suffered from the cancer for a longer period of time, but they did survive this period for that same amount of time, meaning they most likely were willing to accept care, which indicates that they most likely had a will to live and someone who willingly took care of them.

Individual V0973 suffered from an extreme form of congenital scoliosis would likely have caused the individual to suffer from respiratory problems alongside with unease and disability caused by the individual's posture. The individual most likely received assistance in tasks that acquire a certain amount of strength and stamina which the individual most likely did not have due to their condition. Care might have entailed activities such as providing the individual with food and water, and doing housework chores for the individual, additionally someone might have looked after this person as the individual could have had trouble breathing at night. The individual did not reach a high age, which could mean that the complications caused by the congenital scoliosis eventually became fatal to this person. However, that cannot be said for sure as the person might have died from something unrelated, but based on the skeletal material left, it is a reasonable possibility.

Individual 1346 suffered from Ankylosing Spondylitis which would have caused pain in the lower back, fatigue and stiffness for the individual. The real danger of this disease lies in the fact that it often accompanied with other comorbidities such as respiratory problems and obesity. Additionally, the individual's spine becomes more susceptible to fractures as the bones become more porous. Thus individual might have suffered from various other types unease and disabilities caused by this condition that are not traceable as only the skeleton remained. However, the individual died at a very young age, so it is very likely that other complication, associated with the ankylosing spondylitis caused this early death. Almost the entire spine of the

individual is fused, this must have been a process which had been going on for some time, in which the person's conditioned worsened. It is possible that this was taken note upon by the individual's relatives and they cared for this individual.

As I mentioned shortly in the background chapter, individuals were most likely cared for by their relatives in a domestic setting. This means that there is a high chance that these individuals were cared for at home (Wintle, 2000, p. 42). This might be especially the case for individual V1346, who died as a young adult which increases the chance that its relatives (such as siblings, parents, uncles, aunts, neighbours) saw the individual's condition worsen over time and might have supported this person. There are no records of how particularly these individuals lived and where they have stayed during their lives, which means that there might still be a chance that the individuals sought for care and assistance in their lifetimes that involved other care facilities such as the civic hospitals, *tuchthuizen* (Israel, 1997, p.69), or help from a nurse (Fissel, 2008, p.13). It is not possible to exclude that the individuals were supported by the church too. But as the individuals are thought to be from the lower class it is likely that they did not seek any type of care which came at a (high) price as (medical) care was little sought after (Deneweth & Wallis, 2016, p. 547). Moreover if these people were cared for in a guesthouse, they would most likely have been buried at the cemetery of their guesthouse, which is not the case for any of these individuals. So they at least did not die during a stay at one of Arnhem's guesthouses. Additionally, in the early modern era, people were generally more involved in religion, which means that there is a chance that people perhaps did not actively seek out any type of care beside the care that was given to them by their relatives because they had accepted their faith, as this faith was ordered by god (Deneweth & Wallis, 2016, p. 536).

5.2 What does the care provided say about Arnhem as a community?

As illustrated in this thesis, the city of Arnhem possessed several facilities that dealt with caring for its citizens. A big stakeholder in the city's network of care facilities is the church, which funded guesthouses and nurses, spiritually cared for its followers and were involved in charity (Paquay, 2021, p.53; Grell, 1997, p. 49; Grell, 1997, p. 48). The local government was also involved in caring for its disabled and sick community as civic hospitals were founded were people who could not afford to live on their own and who needed care could stay and be cared for (Israel, 1997, p.69). Additionally the local authority sought to keep its civilians save from plagues that were perceived as dangerous, such as lepra and syphilis, by establishing guesthouses were people who suffered from these diseases were ought to stay (Paquay, 2021, p. 57). Here the city attempts to protect its citizens by taking measures, however also a distinction is made between groups of people, which may have caused social separation between people. Especially because people that suffered from certain contaminable diseases such as lepra were cast out by their relatives. Overall the early modern society was involved in scientifically researching disease and the correlation with hygiene (Israel, 1997, p. 73) and the city of Arnhem applied this in order to be able to care for its civilians. This means that the authorities and the church sought to keep their citizens save and aimed to protect them from homelessness, plagues and suffering.

Even if the individuals I analysed did not took advantage of the facilities the city had to offer, if they were eligible to apply to these, they must have had someone in their lives that took care of them, as they did not die from their lesion immediately. It was for instance common practice for family member to live in the vicinity of each other, so they could provide for each other or care for one another if necessary (Boele & De Moor, 2018, p.456). Additionally it was common practice for children to visit their parents or grandparents, so especially in family relations, the social cohesion was quite strong and the threshold to provide care was low (Boele & De Moor, 2018, p.456). The fact someone looked after these individual means that there must have been some kind of social cohesion among the communities these individuals were part of. As they were disabled and could probably not have contributed a lot to their society, the community still valued their lives.

5.3 Reflection on the appliance of the Index of Care

The Index of care has proven to be a useful and practical tool for researching care in the past as it brings the focus to the individual, and through researching the individual a reflection of the collective and its values and principles in regards of care. Which also entail the research aims of this thesis. However, when I applied this method when working on the results I felt quite uncomfortable because even though it is possible to determine certain disabilities and diseases through pathological lesion on bones, it is impossible to grasp the full extent of someone's suffering. Additionally, it is possible that the individual's did not experience their condition as heavy or restricted as I described it, after all I used data from medical articles, there is no way to completely cover the experiences of the individual's as I am restricted to the archaeological record. The sequence of steps that are ought to be taken indeed created a logical and easy-to-follow way to determine what kind of care would have been most suitable for the individual to have had receive. But in my case it could not answer who would have cared for the analysed individuals. Because of the time period and place the research was focused, historic data on care facilities was readily available, but this also complicates as the number of possible caregivers is also high, which makes it hard to specify where the care that was given came from. However as the individuals most likely came from the lower classes, this could imply that care came from the individuals' social circle (Boele & De Moor, 2018, p.456; Deneweth & Wallis, 2016, p. 547).

In the field of history, where studying care in the past is also becoming more common, an approach known as *Person-centredness,* focuses on the care from the past as well, note, this approach has a higher emphasis on health care (Nyborg et al., 2018, p. 1). This approach seems to reveal and better understand care from the perspective of the one who receives care, with the "ordinary person" as starting point (Nyborg et al., 2018, p. 2). Another aim of this approach is to better understand the relationship between patients and provisioners of care such as nurses or physicians (Nyborg et al., 2018, p. 3), also taking in account the perspective of the caregivers. This approach relates closely to the Index of care even though it is taken from a historical perspective. For my research, literature that is historical in nature has been a big part of the dataset, for the background chapter for instance. So this development of care receiving more attention in the area history is also beneficial for archaeologists who need a historic framework to determine the possibilities and limitations of the care of the region and period they are studying. For (bio-) archaeologists who study care in the prehistoric period this might be less interesting.

But in reverse, I think (historic-)archaeology might support historical studies on care by studying and providing data on historical artifacts that are related, such as crouches, braces or medical tools.

Chapter 6: Conclusion

In this thesis I aimed to research how visible and severe disabled people were cared for during the early modern period in Arnhem. I divided the main research question in three sub questions which are: what does pathology say about the living conditions and quality of life of these individuals? and what could care have looked like for the Arnhem individuals?
Lastly, what does this say about the Arnhem population and their attitude towards disability and disease? For my research I applied the Index of Care in combination with a historic background to be able to say something about care in the Early modern period for Arnhem's severely disabled community. I applied the Index of care using three skeletons that come from the cemetery of the St. Eusebius church in Arnhem. In this chapter I would like to present the conclusions of my research and I would like to end this chapter with multiple suggestions for further research.

6.1 What does pathology say on the quality of life of the analysed individuals?

For the three individuals from the St. Eusebius church, a description of the most important pathology was created from which a diagnosis had been derived. From this diagnosis and the pathological lesion a overview of the clinical and functional impacts was created for each of the individuals, which I will shortly summarise here.

The most important pathological lesion for individual V0476 could be found on the sacrum and on the vertebrae, from this lesion it became clear the this individual suffered from prostate cancer, Schmorl's nodes and intervertebral disc disease. These conditions would have caused the individual an uncomfortable life, in which pain, fatigue, impotence, incontinence and emotional distress would have decreased the individual's quality of life.

For individual V0973 the most important pathological lesion can be found in the spinal cord, which is diagnosed as congenital scoliosis. This type of scoliosis would have an effect on the individual's respiratory system and on the functionality of the limb, internal organs as well as stature. As a result this person would not have been able to do any type physical activity that requires strength or a normal stamina, such as cleaning or carrying goods. Additionally, the individual might have had difficulty dressing or taking care of personal hygiene. The impact of this disease must have decreased the individual's quality of life.

The most important pathological lesion for V1346 can also be found in the spine, as most of the vertebrae are fused together, additionally several ribs have grown stuck the vertebrae. Moreover scoliosis and kyphosis are present in the spine. These lesions are associated with Ankylosing Spondylitis which causes unease in moving, sleeping and standing for longer periods of time. Pain and stiffness are also associated with this condition as well as the presence of comorbidities. This individual died quite young, so it is likely that the quality of life must have been decreased as the suffering lead to death at a young age.

6.2 How care for visible and severe disabled people was organised

People who were visible and severely disabled were most likely taken care of by the relatives. Additionally the church paid for nurses to take care of sick or disabled people if no relatives were present to do so. Severely disabled people could also stay in the civic hospital if they were unable to provide for themselves. Guesthouses were also present in Arnhem, but it is not likely that the individual that are analysed stayed in a guesthouse, because they were nut buried on the cemetery of a guesthouse. Civic welfare and funds were available to provide care for those who needed it, such as the severely disabled people in the community.

6.3 What does the way care was organised say about Arnhem's population towards care and disability?

The city's authority and the church provided a safety net for people who suffered from sickness and disability as care facilities were established and were accessible for people, also those of the lower class. Despite that disabled people could not contribute or contribute a lot in the community, these people could still be housed and be cared for, either by relatives, which took this role upon them the most, or by institutes. The life's of these people were valued and caring was seen as good deed, especially for the church as the clergy saw this as their civic duty. From the early modern period onwards civic welfare and hygiene became important matter for the local governments in the Netherlands, so it naturally became common practice to house the disabled and sick. Taking care of each other was most likely also common practice in families, where members of a family often took care and provided for each other. Overall, disabled people were not treated differently, they were supported and cared for so they could have as close as a normal life as possible. Only people who suffered from syphilis or lepra would be cast out by the community, and forced to live in a separate guesthouse.

6.4 The Index of Care as method to study care in the past

The Index of Care is a method that has been proven very useful in my research because it provides a clear and logical structure to understand the disability that individuals suffered from based on the pathology that is found on the skeleton. This is because one has to research the clinical and functional impacts caused by disease first to understand what kind of care must have been needed by an individual. However as one is restricted to the archaeological record it feels a but uncomfortable to write about the functional impacts of the conditions as it is impossible to know to what extent an individual indeed suffered from their conditions. It is therefore important to keep an open mind and to take in account that the perspective of the analysed individual might differ. The index of care is a beneficial method because it allows the focus on the individual rather than the collective, but it still helps to understand the values and the norms in society of the past in regards of care provisioning.

6.5 Further research

During my research I mainly focused on individuals, pathology, osteology and historic sources on institutions that provided care. But little has been written on the specific tasks or acts of care that were carried out in the past by institutes, nurses or other individual caretakers. Often only a broad or general view is given on what the tasks of these entities looked like. It might be interesting for historians and (bio-)archaeologists to look further in the activities and pursuits of the caregivers of any kind. Even though medical care is just a segment of care. For further research it might be interesting to take along information on artifacts or tools, as far as they can be found in the archaeological record, that were used to care for people or take in account methods that were used to help disabled people such as crutches, braces or canes to support people or medical instruments. This could make studying care from the past more tangible and the area of history, in which also an interest in care is developing, can benefit from this archaeological perspective.

Additionally I would suggest creating a broad framework of historic information, if this is available, because skeletal material as an isolated material cannot help us understand the full extent of possible ways an individual was cared for in the past.

Abstract

The purpose of my thesis is to research how individuals from the lower class with severe and visible disabilities were cared for during the Early modern period in the Dutch city of Arnhem. To be able to say something about care for these individuals I use historic literature, which functions as a historical framework, and I apply a bioarchaeological method known as the Index of Care, in which pathology found on skeletal remains form an important source of information. I will use pathology found on three skeletal individuals, from Arnhem, to say something about the living conditions of these people and what their quality of life might have looked like considering their disability. Based on the historic literature I provide the reader with an image of what care might have looked like for these individuals. And I research what this says about Arnhem's population of the time and what their perspective was on their disabled and sick community. Arnhem would have different facilities in which people could be provided with care. Guesthouses played a major role in the caring for the city's poor, sick and disabled community. In these guesthouses people could stay for a certain period of time up until a lifetime, depending on the guesthouses' regulations. The church offered food, prayers and housing (also through guesthouses) to those in need as well. Additionally there were physicians and apothecaries that took care of the medical aspects of care for those who could afford it. However we must not forget that most of the disabled and sick individuals were most likely cared for by their relatives. The three individuals I analysed, must all have been cared for, for a longer period of time, most likely till their death. Based on these results and the historic framework, it is known that the lower class of Arnhem that was harshly disabled or sick would have been able to receive care if they needed to, and that this was provided by parties from different angles of society such as the church, the individual's own social circle and the local guesthouses. This means that the early modern Arnhem cared for their disabled and sick population and that these people were seen as individuals that are entitled to housing, food a normal live and (medical)-care.

Bibliography

Arlet, V., Odent, T. & Aebi, M. (2003). Review: Congenital scoliosis. *Eur Spine J 12,* 456 – 463.

Boele, A. & De Moor, T. (2018). Because family and friends got easily wary of taking care: a new perspective on the specialization in the elderly care sector in early modern Holland. *Economic History Review 71(2),* 437 – 463.

Boonen, A. & Van der Linden, S., M. (2006). The burden of Ankylosing Spondylitis. *J Rheumatol 78,* 4 – 11.

Breedveld, F., C. (2004). Osteoarthritis- the impact of a serious disease. *Rheumatology 43,* 4 – 8.

Campbell, R., M., Smith, M., D., Mayes, T., C., Mangos, J., A., Willey-Courand, D., B., Kose, N., Pinero, R., F., Alders, M., E., Duong, H., L. & Surber, J., L. (2003). The Characteristics of Thoracic Insufficiency Syndrome Associated with Fused Ribs and Congenital Scoliosis. *The journal of Bone and Joint Surgery 85(3),* 399 – 408.

Chandratre, P., Roddy, E., Clarson, L., Richardson, J., Hider, S., L. & Malen, C., D. (2013). Health-related quality of life in gout: a systematic review. *Rheumatology 52,* 2031 – 2040.

Cunningham, A., & Grell, O. P. (1997). *Health care and poor relief in Protestant Europe, 1500-1700*. Routledge.

Deneweth, H. & Wallis, P. (2016). Households, Consumption and the Development of Medical Care in the Netherlands, 1650 – 1900. *Journal of Social History 49 (3),* 532 – 447.

Denmeade, S., R. and Isaacs, J., T. (2002). A history of prostate cancer treatment. *Nat Rev Cancer 2(5),* 389 – 396.

Drzymalski, D., M., Oh, W., W., Werner, L., Regan, M., M., Kantoff, P & Tuli, S. (2010). Predictors of survival in patients with prostate cancer and spinal metastasis. *J. Neurosurg: Spine 13,* 789 – 794.

Eton, D., T. & Lepore, S., J. (2002). Prostate cancer and health-related quality of life: a review of the literature. *Psycho-oncology 11,* 307 – 326.

Fissel, M., E. (2008). Introduction: Women, Health, and Healing in Early Modern Europe. *Bulletin of History of Medicine 82*, 1 – 17.

Hedequist, D. & Means, J. (2004). Congenital Scoliosis. *Journal of the American Academy of Orthopaedic Surgeons 12 (4),* 266 – 275.

Halcrow, S. E. (2017). Review article: New bioarchaeological approaches to care in the past. *Antiquity 91,* 1101 – 1103.

Herr, H., W. (1997). Quality of Life in Prostate Cancer Patients. *CA CANCER 47*, 207- 217.

Klaassen, Z., Tubbs, R., S., Apaydin, N., Hage, R., Jordan, R. & Loukas, M. (2011). Vertebral spinal osteophytes. *Anat Sci Int 86,* 1 – 9.

Koeneman, K., S., Yeung, F. & Chung, L. W. K. (1999). Osteomimetic properties of Prostate Cancer cells: A hypothesis supporting the predilection of Prostate Cancer Metastasis and Growth in the bone environment. *The Prostate 39,* 246 – 261.

Kornblith, A., B., Herr, H., W., Ofman, U., S., Scher, H., I. & Holland J., C. (1994). Quality of Life of Patients with Prostate Cancer and Their Spouses: The Value of a Data Base in Clinical Care. *CANCER 73 (11),* 2791 – 2802.

Lindsay, K., Gow, P., Vanderpyl, J., Logo, P. & Dalbeth, N. (2011). The Experience and Impact of Living With Gout A Study of Men With Chronic Gout Using a Qualitative Grounded Theory Approach. *Journal of clinical Rheumatology 17*, 1 – 6.

Logothetis, C., J. & Lin, S. (2005). Osteoblasts in prostate cancer metastasis to bone. *Cancer 5*, 21 – 28.

McKenzie, L. & Sillence, D. (1992). Familial Scheuermann disease: a genetic and linkage study. *J Med Genet 29*, 41 – 45.

Nederveen, Meerkerk, E. & Teeuwen, D. (2013). The stability of voluntarism: financing social care in early modern Dutch towns compared with the English Poor Law, c. 1600–1800. *European Review of Economic History 18*, 82 – 105.

Nyborg, V., N., Hvalvik, S. & McCormack, B. (2018). *Scandinavian Journal of Caring Sciences,*1 – 7.

Paquay, V. (2021). *De Sint Nicolai Broederschap in Arnhem*. Uitgeverij Verloren.

Ristolainen, L., Kettunen, J., A., Heliovaara, U., M., Heinonen, A. & Schlenzka, D. (2012). Untreated Scheuermann's disease: a 37-year follow up study. *Eur Spine J 21*, 819 – 824.

Sakai, D. & Grad, S. (2015). Advancing the cellular and molecular therapy for intervertebral disc disease. *Advanced Drug Delivery Reviews 84*, 159 – 171.

Schrenk, A. (2019). A community of Care: Patterns of Pathology and Trauma with a Focus on the bioarchaeology of Care at Carrier Mills, IL (10.000 – 1000 BP). UNLV Theses, Dissertations, Professional Papers, and Capstones 3844, 1 – 285.

Thomas, D., R. (2004). Anemia and Quality of Life: Unrecognized and Undertreated. *Journal of Gerontology: MEDICAL SCIENCES 59A(3)*, 238 – 241.

Tilley, L. (2015). *Theory and Practice in the Bioarchaeology of Care*. Springer International Publishing. DOI 10.1007/978-3-319-18860-7.

Tilley, L. & Cameron, T. (2014). Introducing the Index of Care: A web-based application supporting archaeological research into health-related care. *International Journal of Paleopathology 6*, 5 – 9.

Tilley, L. & Oxenham, M., F. (2011). Survival against the odds: Modeling the social implications of care provision to seriously disabled individuals. *International Journal of Paleopathology 1*, 35 – 42. DOI:10.1016/j.ijpp.2011.02.003.

Walker, P., L., Bathurst, R., R., Richman, R., Gjerdrum, T. & Andrushko, V., A. (2009). The Causes of Porotic Hyperostosis and Cribra Orbitalia: A Reappraisal of the Iron-Deficiency-Anemia Hypothesis. *American Journal of Physical Anthropology 139*, 109 – 125.

Wintle, M. (2000). he condition of the people: public health, diet and nutrition. In M. Wintle (Eds.) *An Economic and Social History of the Netherlands, 1800–1920*, (pp. 40 – 68). Cambridge University Press.

Zielman, G. & Baetsen, W., J. (2020). *Wat de nieuwe Sint Jansbeek boven water bracht: dood en leven in het Arnhemse verleden. Archeologisch onderzoek Sint Jansbeek te Arnhem*. RAAP-Rapport 4476. Raap Archeologisch Adviesbureau.

Websites

https://www.cdc.gov/ncbddd/heartdefects/tetralogyoffallot.html#:~:text=Tetralogy%20of%20Fallot%20(pronounced%20te,the%20mother's%20womb%20during%20pregnancy, accessed 09-05-2022.

https://creakyjoints.org/about-arthritis/axial-spondyloarthritis/axspa-healthy-living/ankylosing-spondylitis-affects-work-and-relationships/, accessed 09-05-2022.

https://www.geldersarchief.nl/bronnen/archieven?mivast=37&mizig=210&miadt=37&micode=1707&milang=nl&mizk_alle=Gelderse%20Landdagsrecessen%20pest&miview=inv2, accessed 25-04-2022.

https://www.google.com/maps/@52.05789,5.8991783,10z, accessed 03-05-2022.

https://www.hopkinsmedicine.org/health/conditions-and-diseases/spinal-cord-compression#:~:text=Key%20points,suddenly%2C%20depending%20on%20the%20cause. Accessed 07-05-2022.

https://veluwezoominbeeld.nl/landschap-en-historie/landgoederen/beekhuizen/sint-catharinae-gasthuis/, accessed 13-04-2022.

https://www.webmd.com/asthma/guide/hypoxia-hypoxemia, accessed 09-05-2022.

https://www.spine-health.com/glossary/degeneration, accessed 14-06-2022.

https://www.spine-health.com/glossary/osteophytes, accessed 14-06-2022.

https://www.osmosis.org/answers/schmorls-node, accessed 14-06-2022.

https://sleepopolis.com/education/tips-for-sleeping-with-scoliosis/, accessed 14-06-2022.

https://www.mayoclinic.org/diseases-conditions/kyphosis/symptoms-causes/syc-20374205, accessed 14-06-2022.

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