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Syphilis in London's Children's Hospitals (1852 - 1921)

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Abstract

Establishing the palaeoepidemiology of diseases in children is a difficult task due to limited written and physical evidence. Historic admissions records from children's hospitals can provide large data sets allowing insights into this area, rather than just case studies which are what most commonly appear within the palaeopathological literature. An oft ignored aspect of childhood illness is venereal disease due to the social taboo surrounding this topic. This study aimed to investigate the extent of syphilis within Victorian and Edwardian London's children's hospitals and explore the socioeconomic context this disease was occurring within. This was achieved by examining digitised hospital admissions data covering the mid-nineteenth to early twentieth centuries for three children's hospitals. These records revealed a significant spike in admissions for congenital syphilis following World War One. This was likely due to the return of troops from the warfront who had been infected whilst in mainland Europe. It was also found that the upper levels of the working classes accounted for the majority of the admissions, despite these institutions being created to aid the children from the lowest socioeconomic groups. Finally, this paper highlights the need for researchers to also consider the possibility of children having acquired syphilis rather than congenital syphilis when examining such records.

Introduction

The study of venereal diseases (VD) in the past, or sexually transmitted infections in modern medical terminology, allows researchers to examine how human sexuality and health intersect, and how these diseases have evolved and spread through populations. The study of childhood health and disease in the past allows researchers to explore the value that past societies placed upon the youngest and often weakest of their members (Lewis 2018). These areas overlap within the study of congenital syphilis.

Studying congenital syphilis in the past

The skeletal changes that accompany syphilitic infections, both acquired and congenital, are well documented within the palaeopathological literature (Aufderheide and Rodríguez-Martín 1998; Waldron 2009; Lewis 2018; Roberts and Buikstra 2019). However, the study of congenital syphilis in palaeopathology and the history of children's health presents a challenge to researchers. The skeletal remains of non-adults are not commonly recovered during archaeological excavations due to taphonomic factors, poor excavation strategy and technique, as well as issues of misidentification and/or disposal (Lewis 2019). Accordingly, few large-scale archaeological studies of congenital syphilis exist. A Google Scholar search using the search terms "congenital syphilis archaeology" returned 612 results published since 2016. Of these, less than 20 papers discussed cases of congenital syphilis in archaeological/historic human remains, and the majority of these were single case studies, thus highlighting the dearth of studies regarding this topic. Whilst this is not an exhaustive search using multiple combinations of search terms to

capture all possible results, it is highly unlikely that repeating the exercise would identify many more papers. Indeed, Lewis (2018) listed only 18 possible cases of congenital syphilis reported in the palaeopathological literature with the majority being from the Americas.

At present, the authors could only find three reported cases of congenital syphilis within British palaeopathology, all of which were from London. Two cases were from the medieval and post-medieval period (Walker 2012; Walker et al 2015). The third was from the Victorian period and consisted of a singular skull curated in the Pathology Museum of Imperial College London, belonging to a one-year-old girl named Rosa Pike who died in 1886 (Patel and Mitchell 2007). Similarly, the largest reported collection of non-adult syphilitic remains that could be found was a rediscovered historical anatomical collection (Cole et al 2020). This collection originally belonged to the nineteenth century French physician Jules Parrot and consisted of 56 bones, representing a minimum of eight individuals of foetal and neonatal age. These bones were curated by Parrot in the latter half of the nineteenth century from the autopsied remains of syphilitic children, at *l'Hospice des Enfantes Assistés* in Paris, France. Parrot later brought his skeletal collection to the Pathological Society of London and exhibited the bones during a lecture on the skeletal effects of congenital syphilis; the transcript of which was later published in the Lancet (Parrot 1879). Although Dittmar and Mitchell (2016) have shown that medical collections can provide additional contextual information regarding the period in which they were formed, the value of the Parrot collection is arguably more limited than the curated skull of Rosa Pike. The latter was accompanied by an entry card which listed Rosa's name, her symptoms, and her mother's symptoms. This allowed Patel and Mitchell (2007) to identify a birth and death certificate for Rosa and explore her precise life circumstances and illness. In contrast, Cole et al (2020) had no other contextual information beyond what the bones themselves could provide about the individuals they were sourced from, and thus the researchers were limited in regard to what may be deduced about *l'Hospice des Enfantes Assistés* and its patients at the time Parrot was performing autopsies and building his collection.

Where physical evidence is lacking, written evidence may be used to investigate questions of the past. However, few historical records focus on children, and even fewer focus on childhood diseases (Heywood 2017). Historic hospital records are an exception to this and may be used on their own or as a complementary source of data within palaeopathological studies (Hirst 2018). Hospital admission data does not always present an easy alternative due to the time needed to access, examine, and interpret physical records. Instead, the digitisation of records can aid the interpretation of such data, however the resources required to undertake this process (finance, technology, transcribers, etc.) can equally present barriers for both researchers and institutions (Hirst 2018). Additionally, hospital records present some of the same issues as archaeological skeletal assemblages, in that they are not representative of the whole population, as only the sick are represented, and researchers can only examine those records which survive (Waldron 2007).

The Historical Hospital Admission Records Project (HHARP) is an open-source online repository (https://hharp.org) that brings together two-thirds of the surviving admissions registers for nineteenth century children's hospitals in Great Britain (Hawkins 2012). This project formed from a collaboration between Kingston University's Centre for the Historic Record and four children's hospitals within London and Glasgow. The included institutions are, from London: Great Ormond Street Hospital and its convalescent home Cromwell House, the Evelina Hospital, and the Alexandra Hospital for Children with Hip Disease; from Glasgow: The Royal Hospital for Sick Children. The HHARP project includes over 140,000 admission records, covering the period between 1852 and 1921.

This paper uses the HHARP dataset to identify the number of children diagnosed with syphilis that were admitted to the London hospitals, allowing for the examination of trends in admission, age, sex, deaths, and social background. This will provide the largest investigation of historical congenital syphilis currently in the literature, whilst also highlighting a data source

that may prove valuable for research focused upon children's health in the mid-nineteenth to early twentieth centuries.

The Hospitals

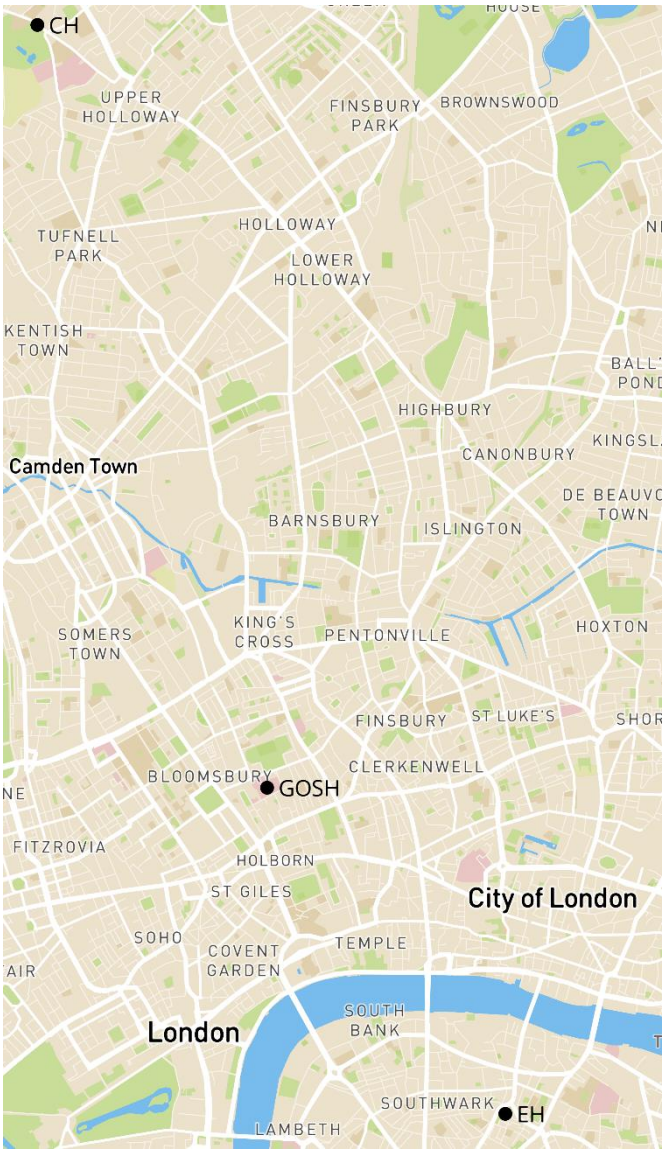

Figure 1: The locations of the two children's hospitals and the convalescent home in London during the examined period.

This investigation focused solely upon Great Ormond Street Hospital (GOSH) and its convalescent home Cromwell House (CH), as well as the Evelina Hospital (EH) (Figure 1). The Alexandra Hospital admitted no children with diagnoses of syphilis, whereas the Royal Hospital in Glasgow was outside of the geographic boundaries of this study.

GOSH was founded in 1852 by Dr Charles West and was the first devoted children's hospital to open in Britain (Tanner and Hawkins 2013). Its principal aims were to provide healthcare for the poor, encourage clinical paediatric research, and to provide training for paediatric nurses. It initially opened with only 10 beds and admitted local patients; it expanded over time, and by 1914 the hospital could admit over 200 inpatients and had an outpatient department treating over 20,000 children (Tanner and Hawkins 2013). GOSH was founded as a charity, with the option for donors and patrons to become Governors of the Hospital, entitling them to be able to recommend patients for admission, with the number of admissions per year being proportionate to their financial contribution.

GOSH's convalescent home, CH, was opened in 1869 to provide a care environment for the youngest convalescing patients, as well as those recovering from surgery or long-term illness (HHARP 2010). The home was opened in response to the governors of GOSH realising that many patients were being readmitted to the hospital's wards soon after being discharged because the circumstances at home mitigated their recovery.

EH was founded in 1869 by Baron Ferdinand de Rothschild with objectives mirroring those of GOSH (Tanner and Hawkins 2013). At the time of opening, EH was unique amongst London's children's hospitals because it was situated within a purpose-built building and was initially privately funded by the Baron, who did so for the first 20 years of its history. By 1900 the hospital had 100 beds, but only the funds to operate 66 of them. This led to the hospital focusing its efforts within its outpatients department, where over 73,000 visits occurred in 1904 (HHARP 2010).

Both hospitals had rules governing who could be admitted and these were based on age and health. The hospitals banned admission of any child with an infectious fever, whooping cough being an exception, and limited chronic or incurable conditions (HHARP 2010; Tanner and Hawkins 2013). Typically, children under two years of age were prohibited from entry. The purpose of this was to help ease the work of the nurses by ensuring that admitted children could walk and

partly feed and clothe themselves; the upper age limit was 10 to 12 years (HHARP 2010; Tanner and Hawkins 2013). Additionally, patients were theoretically meant to have a subscriber's letter to allow admittance. However, these rules were difficult to enforce, as often the medical need of the child won out (HHARP 2010; Tanner and Hawkins 2013).

Syphilis in brief

Syphilis is caused by the bacterium Treponema pallidum pallidum (*T. pallidum*) and has two distinct forms: acquired and congenital. Acquired syphilis is typically transmitted through sexual contact and the infection can be split into three stages. Primary syphilis occurs within, on average, a few weeks after exposure (Baker 2020). This manifests as one or several painless ulcers (chancres) at the site of infection, which spontaneously heal within several weeks. Secondary syphilis occurs after another couple of months and is characterised by flu-like symptoms and rashes which most frequently affect the palms and soles. Again, these symptoms will spontaneously heal after a couple of months. The disease then enters an asymptomatic latency period. After some years destructive lesions, known as gummas, will develop and the disease enters its tertiary stage (Dobson and Sánchez 2019). These gummas can affect multiple tissues, including the skin and bone. When bone is affected by acquired syphilis, it is typically bilateral and involves multiple sites, including most notably the tibia and cranium, of which the nasal structures and vault, are most affected (Roberts and Buikstra 2019). The gummatous lesions on the frontal bone are particularly distinctive and are known as *caries sicca* (Waldron 2009). Tertiary syphilis may also affect the cardiac and nervous systems.

The transplacental infection of syphilis from a mother to a foetus is the most common method for a child to contract congenital syphilis. During pregnancy, syphilitic infection can also lead to spontaneous abortion, still birth, or perinatal death (Baker 2020; Dobson and Sánchez 2019). Rarely, transmission can also occur at birth through contact with a syphilitic lesion. The likelihood of transmission ranges between 60% to 100% during primary and secondary syphilis, with decreasing rates of transmission occurring after the fourth year of infection (Woods 2005; Baker 2020). It is possible that a syphilitic infection may be passed on via breastfeeding, but this is due to the infant's exposure to a syphilitic sore upon the breast, rather than *T. pallidum* being present within breastmilk (Lewis 2007). Effective prenatal screening of mothers can eliminate mother-to-child transmission of the disease. However, transmission still occurs with Wijesooriya et al (2016) calculating that in 2012 there were 930,000 syphilitic pregnancies worldwide, of which 36.7% resulted in adverse outcomes, including stillbirth, neonatal death, preterm birth, and infection with congenital syphilis. Congenital syphilis can be split into two stages. Early congenital syphilis occurs within the first two years of life and late congenital syphilis occurs after this. Most children will not show signs of syphilitic infection immediately at birth; instead, symptoms can develop weeks or years later. Transplacental infection results in widespread presence of *T. pallidum* throughout the foetal tissues (Dobson and Sánchez 2019) leading to multiple organs manifesting symptoms, though not all will occur concurrently (Table 1).

Sexuality in England between 1850 and 1920

The study of sexuality and sexual health during the period examined here suits the historical model of the "long nineteenth century", often described as lasting from 1789 to 1914. Within this model historians refer to World War One rather than monarchical changes as the event which led to the greatest socio-economic and intellectual changes in Europe (Bevir 2001). The sociocultural attitudes that develop during the Victorian period (1837-1901) persisted into the Edwardian (1901-1914) and War (1914-1918) eras. Additionally, it was only at the turn of the twentieth century that medical science started to identify the causative pathogens of VD and develop tests and treatments for them. In the case of syphilis, *T. pallidum* was identified by Schaudinn and Hoffman in 1905, and in 1906 Wassermann introduced his eponymous blood test for the disease (Dobson and Sánchez 2019).

An arsenic based medicine called Arsphenamine, also known as Salvarsan, was then discovered in 1908 by Ehrlich.

TABLE 1. Some of the symptoms seen during early and late congenital syphilis (drawn from Baker (2020) and Dobson and Sánchez (2019)).

Early Congenital Syphilis		
Anatomical Element	**Symptom**	**Definition**
Liver & Spleen	Hepatosplenomegaly	Enlarged liver & spleen
Skeleton	Periostitis	Inflammation of the bone's outermost membrane
	Osteochondritis	Inflammation of the cartilage or bone within a joint
Skin	Maculopapular Rash	Small dark red-copper raised and flat lesions
	Mucocutaneous Lesion	Fissues and mucous patches around the lips, nostrils and anus
Blood	Anaemia	Iron deficiency within the blood
Central Nervous System	Meningitis	Infection of protective membranes around the brain and spinal cord
	Bulging Fontanelle	Firm outward curving soft-spots on the head caused by rising intra-cranial pressure
	Palsies	Types of paralysis frequently accompanied by weakness, loss of feeling and uncontrolled movement
	Seizures	Sudden uncontrolled electrical distrubance in the brain leading to changes in physical and mental wellbeing
	Hydrocephalus	Abnormal buildup of fluid within the brain
Respiratory System	Syphilitic Rhinitis (Snuffles)	White and often bloody nasal discharge
	Pneumonia	Infection of the alveoli in the lungs
Late Congenital Syphilis		
Anatomical Element	**Symptom**	**Definition**
Eyes	Interstitial Keratitis	Scarring of the cornea from chronic inflammation
Dentition	Hutchinson's Incisors	Notched appearance in the permanent upper central incisors
	Mulberry Molars	Maldevelopment of cusps on the first molar
Skin	Saddle-nose	Bridge of the nose collapse
	Hard Palette Perforation	
	Rhagades	Scarring resulting from mucocutaneous lesions
Skeleton	Sclerosing lesions	Abnormally thich and dense bone growth
	Saber Shin	Anterior bowing of the tibia
	Frontal Bossing	Enlargement of the frontal bone
	Higoumenakis Sign	Periostitis of the sternal end of the clavicle
	Clutton joints	Painless arthritis of joints, commonly the knees
Central Nervous System	Tabes dorsalis	Degeneration of spinal cord leading to additional symptoms such as dementia and paralysis
Eighth Cranial Nerve	Deafness	

This drug was called the "magic bullet" due to its highly effective nature and would be used in conjunction with the continuing use of potassium, mercury, and bismuth-based chemicals and silver nitrate until the introduction of Penicillin in the 1940s (Tampa et al 2014). However, these heavy metal-based drugs often produced side-effects that some recorded as being worse than the disease itself (Keen 1953; Dayan and Obi 2005).

From a sociological standpoint, whilst the Victorian period saw an increase in the study of gender, race and class, the ideas at the intersection of these subjects and sexuality were not new ones, but rather revisions upon well-established prejudices (Hall 2013). The moral standards for male and female sexuality during this period could be described as contrary and hypocritical: male sexual access to women was deemed to be a necessity, but chastity was the preeminent female virtue, and any fall from grace led to ostracization from respectable society (Cook 2004; Hall 2013). This double standard was well illustrated through the increased visibility of urban prostitution despite increasing social commentaries praising self-control and marital fidelity (Adams 2004). The consequences of this was an increased risk of exposure to VD for all, sex with prostitutes being the prime route by which syphilis could enter the middle classes (Cook 2004). By the 1880s, the blame for the spread of VD was primarily placed upon men, and this view was maintained into the early twentieth century, with the suffragette Christabel Pankhurst asserting in 1911 that 75% of men had contracted some form of VD prior to marriage (Savage 1990; Hall 2013). Indeed, Cook (2004) noted that of deaths linked to syphilis at the time, the highest rates were seen amongst men of the unskilled labouring classes and of the middle/professional classes.

Syphilis itself became somewhat of a national obsession in the 1880s due to it being seen as a threat to marriage, motherhood, and children (Townsend 2018). Socially, congenital syphilis was seen as a disease which negated childhood, with such children being described as old, exhausted with suffering, and the pallid victims of the vice of life (Townsend 2018). These Victorian beliefs along with the more general beliefs around sexuality persisted into the Edwardian and War eras with the sexual culture remaining relatively homogenous where respectability was considered to be of prime importance and members of all classes and age held negative attitudes towards sexuality (Cook 2004).

Materials and methods

The data present within HHARP includes the admissions data as transcribed from the admissions registers, as well as added standardised data. The information available can be viewed online or downloaded as an Excel file and it covers five main areas:

1. Personal details: The name, sex, age, and birth year of the individual and their date of admission.

2. Residence: The address, county, London district and subdistrict the address can be found in, or whether it was outside of London.

3. Admission and stay: The admitting institution and doctor, the length of stay, ward they stayed on, any remarks made by the doctor at admission.

4. Disease, outcome, and discharge: The disease the individual was admitted with and its ICD10 code, the disease group this belongs to, information about provided treatment, the outcome of the admission, post-mortem information, date of discharge and where the patient was discharged to.

5. Patient history: disease history, whether the patient was vaccinated for smallpox, and the parents' occupation.

A core of information is available for almost all admissions: the child's name, their age at admission, and their sex. The address of the admitted child is present in most cases. Also, frequently present is information regarding the diagnosis, dates of admission and discharge, and the result of the child's treatment during their admission. This final category is recorded as: a) Cured; b) Relieved; c) Not Relieved; or d) Died. Some areas of the data are only present in a single hospital's register. For example, only the Evelina Hospital provides post-mortem data for some of the admissions (Hawkins 2012).

The HHARP database was initially searched for all children admitted for VD using the "Venereal Disease"

category in the disease groups' options. Another search was made using the search terms "venereal" and "syphilis" in conjunction with the "Congenital Disorder" category. Hospitals outside of London and/or with no admissions for syphilis were excluded from the dataset. The remaining data was cleaned by removing duplicate records, which are multiple records listing the same individual entering the same institution on the same day. Then the names of the children in this cleaned dataset were used as their own search criteria to identify children who were admitted to hospital multiple times, regardless of diagnosis.

Data detailing refusals of admission into GOSH between the years 1881 and 1892 is available by request through HHARP. This data includes the names of the patient, the patient's address, a diagnosis, the date of and reason for refusal. This data was also searched for patients admitted with a diagnosis of syphilis.

Where an address was recorded and deemed by HHARP to be within London, a likely socioeconomic class for the child at the time of admission was identified using the Booth Poverty Maps (http://booth.lse.ac.uk). This is an open-source online resource available through the London School of Economics. The Maps synthesise the socioeconomic data collected between 1889 and 1903 by Charles Booth and covers a region running from Greenwich to Hammersmith on an East/West axis, and Hampstead to Clapham on a North/South axis, with the City of London omitted. Seven socioeconomic categories were used by Booth to categorise London: Lowest Class; Very Poor; Poor; Mixed; Fairly Comfortable; Middle Class; Upper-Middle and Upper Classes. If a street could not be found due to being outside the map borders, changes in street names or layout, or if a street exhibited multiple socioeconomic statuses, a socioeconomic status of "Unknown" was recorded. For addresses outside of London, Google maps was used to estimate a straight distance (rounded

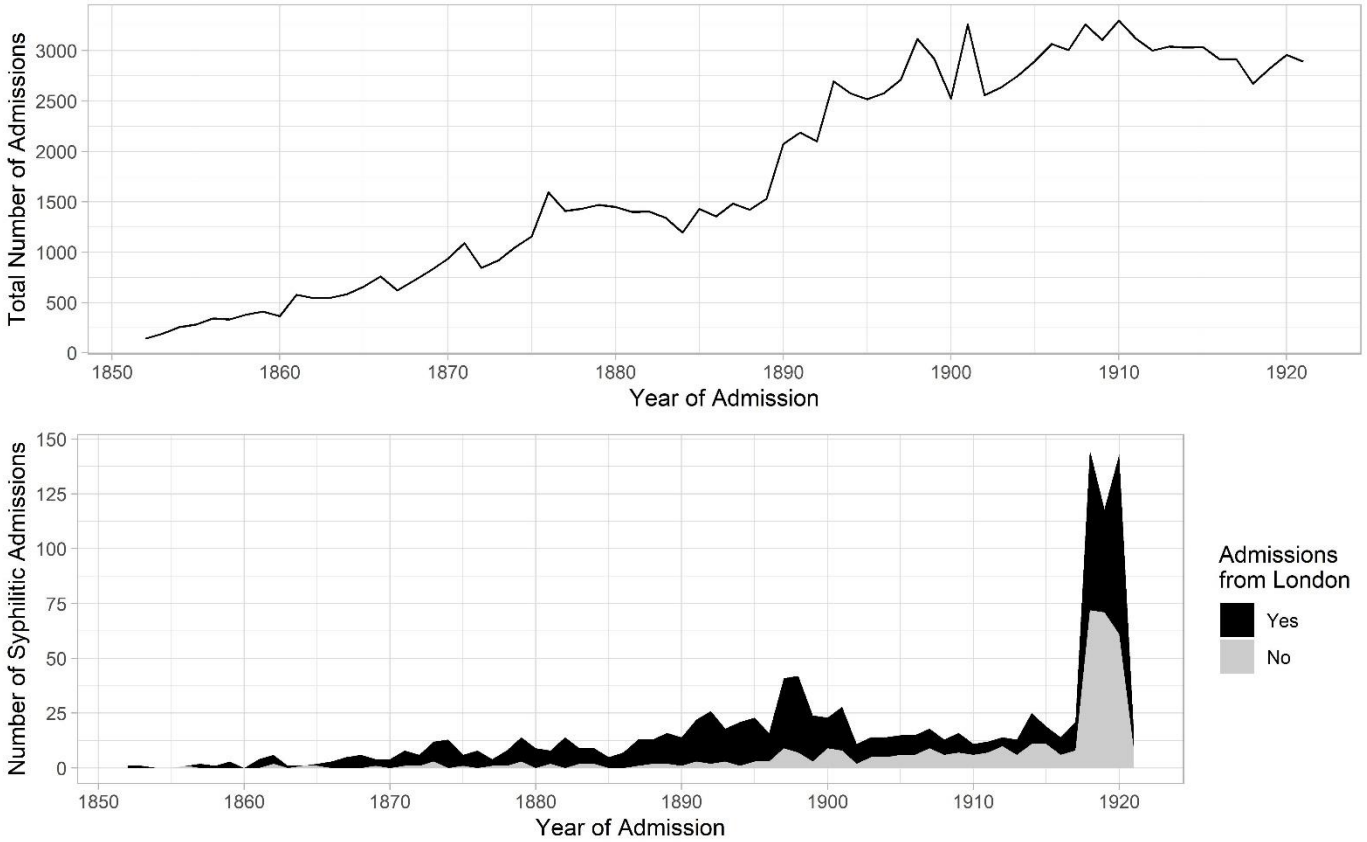

Figure 2: The total number of admissions and the number of syphilitic admissions recorded within the HHARP database from GOSH, CH and EH.

to whole kilometres) travelled by the child to reach their admitting institution.

Results

Admissions

Between 1852 and 1921, 1,194 children were admitted into GOSH, CH and EH with a diagnosis of syphilis (GOSH: 993; EH: 147; CH: 54) representing a total of 803 individuals, 391 males and 412 females. These represent 0.96% of the total admissions to the three institutions during this period, with between 0 and 145 admissions for syphilis occurring each year (Figure 2) with just over a third of these admissions (n=406, 34.00%) being admitted between 1918 and 1920.

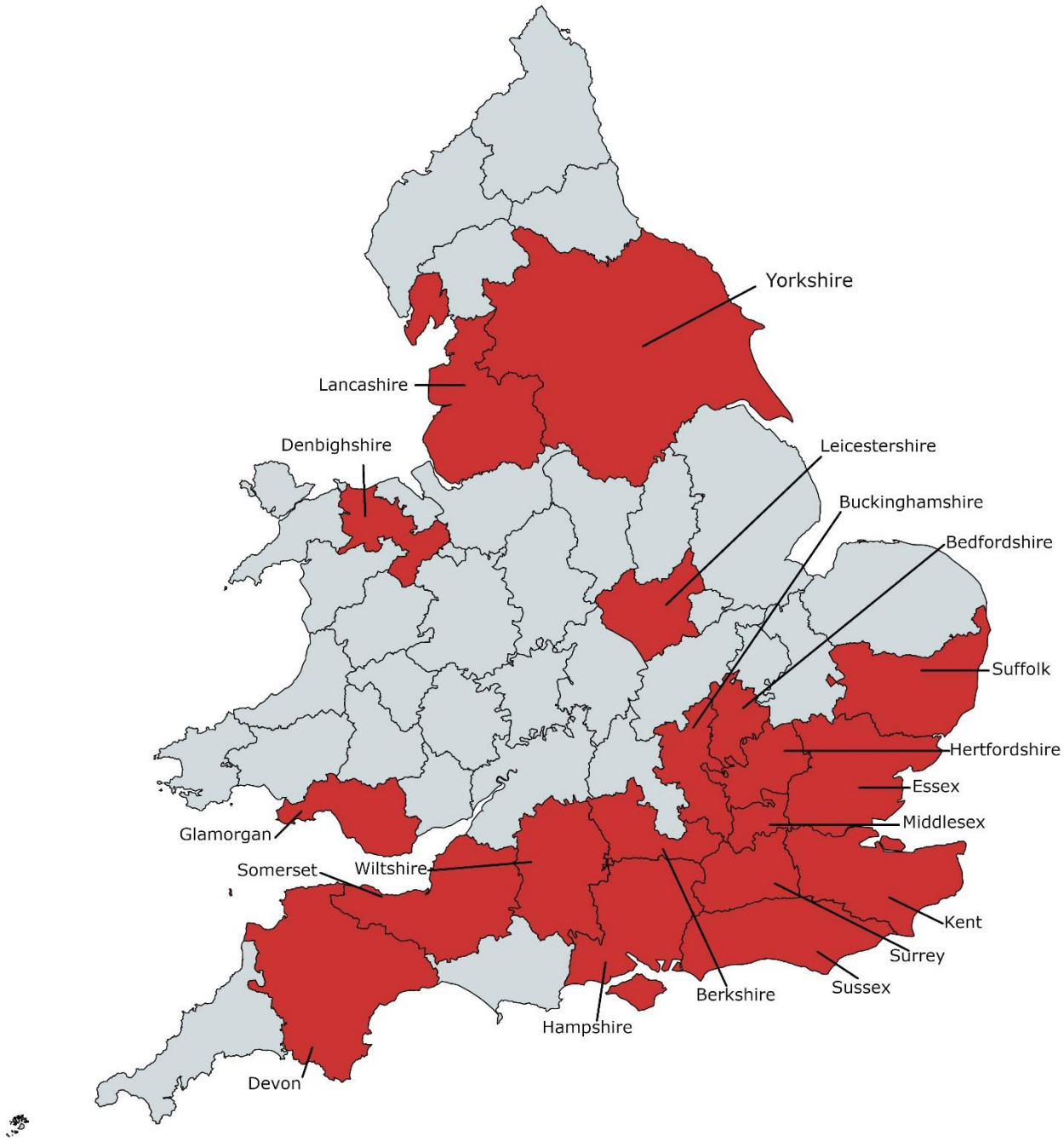

Figure 3: The historic counties of England and Wales, excluding Jersey. The highlighted and named counties are those from which children were admitted to the institutions in this study.

In addition to the diagnoses of syphilis, 217 children were admitted with additional diagnoses (n=234) representing 116 conditions. The two most common conditions present were marasmus (n=22), a severe form of malnutrition, and bronchopneumonia (n=15). There were also 26 types of conditions which would have affected bone. These occurred 44 times in the register and in 40 children. The most commonly recorded was periostitis (n=6), though periostitis of the femur and of the knee were also listed (both n=1). "Caries", "disease", "necrosis", and "tubercular" were descriptive terms used in the register for the conditions affecting specific bones or joints. This occurred 18 times, with the tibia (n=4), knee joint (n=2), mastoid (n=2), radius (n=2), ulna (n=2), spine (n=1), maxilla (n=1), mandible (n=1), fingers (n=1), and hips (n=1) all being recorded.

Children from within London (n=791) were admitted more commonly than those outside of London (n=403), with a mean admittance of 11 children from within London and six from outside of London per year. These values drop to nine and three, respectively, for the years outside of the 1918 to 1920 spike in admissions. Two-hundred-and-forty individuals make up the admissions outside London with 177 of these being within what would now be classed as the Greater London area. The shortest distance from the child's home address to the admitting institution was 5km from Finsbury Park, London. This area is just outside the northern edge of the Booth Maps. The mean distance travelled by the children was 28.52km. Only 42 children travelled distances greater than this mean value, and 27 of these were from within the counties surrounding London. Six children travelled over 200km with two children travelling from Wales, and one child each from Jersey, Yorkshire, Devon, and Lancashire with the greatest distance being 356km (Figure 3).

Age at admission

Age at admission data was present for all children except five. The age at admission ranged between 11 days old to 13 years and 11 months. Categorising the data into year groups showed that children under one year of age were the most represented age group (n=271; 22.70%) (Figure 4). A t-test of equal variance showed that there was no significant difference between the number of males and females admitted into the hospital, however males were slightly more

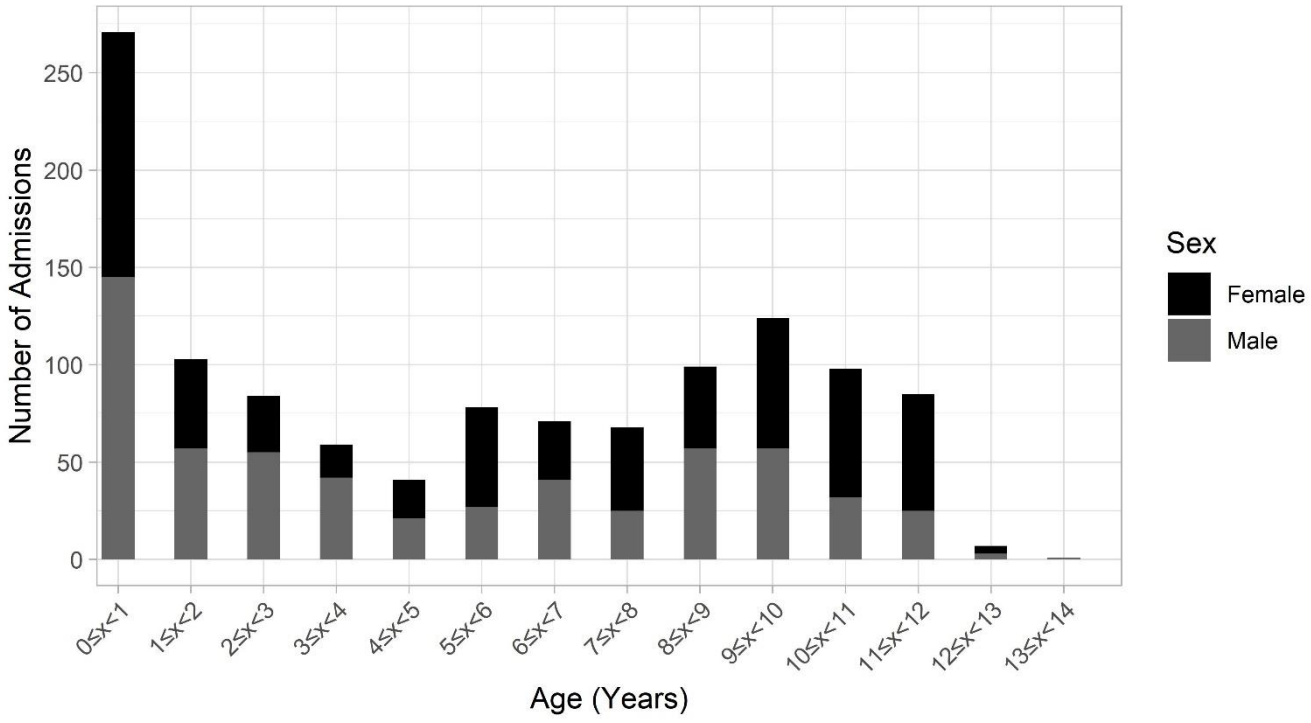

Figure 4: The number of syphilitic admissions to GOSH, CH and EH, split by age and sex.

represented in the younger third of the age groups (0 to 5 years old), whilst females were more represented in the oldest third of the age groups (10 to 14 years old).

Outcome

Outcomes were provided for 1,161 of the admissions (97.24%). “Relieved” (n=715) was the most common outcome recorded, accounting for 61.56% of the outcomes. An outcome of “cured” occurred 113 times (9.73% of outcomes). If “cured” and “relieved” are interpreted to mean symptoms absent by time of discharge, they account for over 70% of outcomes recorded. There were 139 (11.97% of outcomes) children who were “not relieved” of their symptoms during their admission, and 194 (16.25% of outcomes) children died after admission.

Socioeconomic status

Socioeconomic data was found for 648 (81.90%) of the addresses within London. Of these the most common socioeconomic statuses recorded were “mixed” (28.21%) and “fairly comfortable” (33.25%), representing the upper levels of the working classes. The poorest and richest socioeconomic groups were the least represented (Figure 5).

Repeated admissions

There were 212 children (26.40% of the admitted children) admitted multiple times into the hospitals with diagnoses of syphilis and other conditions. Most were only admitted twice (n=96), with 10 children being admitted 10 times or more: the maximum number of admissions for a single child was 13. Among the children admitted to GOSH, 65 were transferred to CH, with 53 of these being transferred just once. The remainders showed transfers between different wards at CH or being returned to GOSH.

There were 105 conditions other than syphilis present within the admissions records of the children who were repeatedly admitted. Periostitis of the tibia (n=14) and keratitis (n=10) were the most common. Where the diagnosis clearly indicated the element of the body

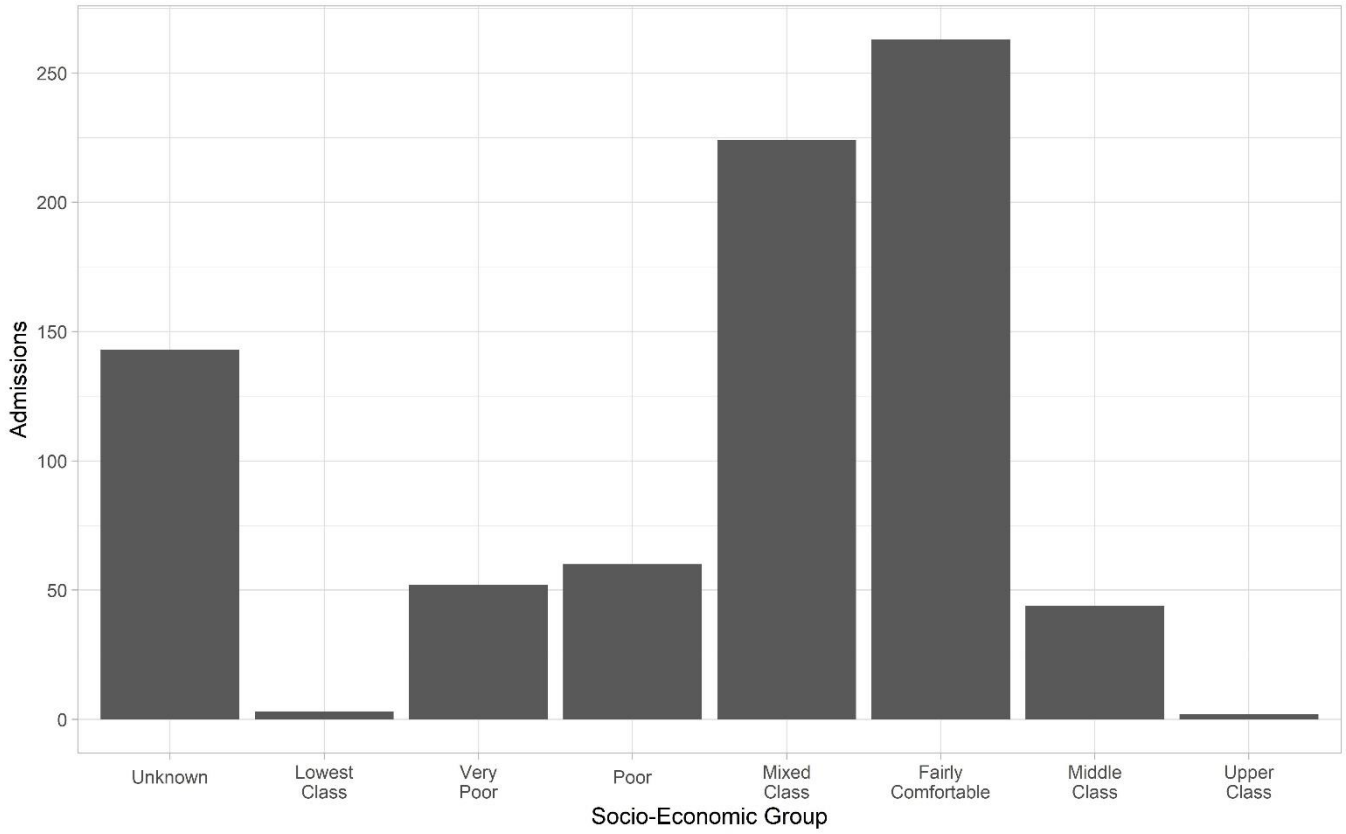

Figure 5: Likely socioeconomic statuses for the children admitted from within London.

affected by disease, the eye (n=19) and the knee and the tibia (both n=17) were the most affected elements.

Relatives

Four sets of likely relatives (defined by a shared surname and address) were present in the data, all admitted into GOSH. The Taylors, Victor (1 year old) and Eustace (3 months old), were admitted in October 1901 and March 1902 respectively, and both died after admission. The Clarks, William (3 years, 3 months old) and Emily (7 months old), were admitted in May and August 1918, respectively. Emily died after admission whilst William's symptoms were not relieved. The Heywood/Haywoods, Bertha (9 to 10 years old) and Percy (5 to 6 years old) were both admitted six times in the latter halves of 1918 and 1919 respectively, and were "relieved" of symptoms on all admissions. Finally, there were the Tavener/Taverners, Daisy, Edith and Emily who were collectively admitted a total of 22 times. Daisy (4 to 5 years old) was admitted 10 times between March 1918 and June 1919. Emily (5 to 8 years old) was admitted seven times between April and July 1919. Edith (10 years old) was admitted five times between July and September 1919. The sisters survived their admissions, but only Emily was recorded as having outcomes of "relieved" for every admission. The Haywood/Heywoods were from outside of London, whilst the socioeconomic statuses of the others are as follows: Clark and Tavener/Taverner: "Fairly Comfortable"; Taylor: "Unknown".

Deaths

A total of 194 (16.25%) children died after an admission for syphilis. More males than females died (106 versus 86 respectively), with 71.13% of deaths occurring before 1 year of age, and 90% before 3 years of age. The number of deaths per year ranged between 0 and 15, with a mean number of 2.74 deaths per year. When split into the socioeconomic groups, the only group with no deaths was the "Lowest Class" group, and the unknown addresses had 24 deaths (4.39%). In the "Very Poor" to "Middle Class" groups approximately 20% of admissions died. The "Upper Class" group had a 100% death rate. Of the children who died only 10 had any post-mortem information recorded in the admission records. Of these, none provided a cause of death, and they listed only the observed anatomical changes found during the post-mortem. Three causes of death were listed in the remarks section of the HHARP data, one being diphtheria, one congenital syphilis and the last rickets, congenital syphilis, and tuberculosis. There was no clear seasonal patterning to the deaths, with the least deaths occurring in May (n=12) and the most deaths in August (n=22). Spring months (March, April, May) showed the least deaths (n=43) whilst the summer months (June, July, August) showed the most (n=53). A mean of 16 deaths occurred per month, and a mean of 48 deaths occurred per season.

Treatment

Only 90 admissions, all from EH, contained information about the treatment a child received during their admission. The ages of the children treated ranged from possible neonates (age of 0 years and 0 months) to 13 years and 11 months. Shorthand is frequent so not all the treatments were clear. From what is legible, the most common treatment seen was the use of mercury (n=56), though potassium iodide (n=18) and silver nitrate (n=6) were also administered. These were administered to children of all ages, and 11 children were treated with both mercury and potassium iodide. There were also 23 listings of a surgical operation, most simply listed as that, but specifics include drainage of abscesses, a mastoidectomy, and an enucleation of an eye. Six of these also listed the use of chloroform, presumably as an anaesthesia. There is also a listing of a child being given "raw meat juice", possibly linked to the child's diagnosis of marasmus, a severe form of malnutrition.

Refusals

Between 1882 and 1891, 1,481 children were refused admission into GOSH. Only eight of these were diagnosed with syphilis. Three were female and two were male, and the remaining three lacked information indicative of sex. Three socioeconomic statuses could be identified: "poor", "mixed", and "fairly comfortable". The reasons for refusal included three children who were underage, one child who was deemed "unsuitable", and an occurrence of no available beds. Two children received treatment during their appointment, although there was no further

information regarding the treatment, and three children were made into outpatients

Discussion and Conclusion

Admissions

As seen in Figure 2, a spike in syphilitic admissions occurred between 1918 and 1920, with admissions exceeding 100 children in each of these years. The authors propose that this spike in children being admitted with syphilis was a by-product of WWI, as this spike immediately followed the conclusion of this conflict and the return of troops. During the war it was a generally held belief within society that sexual intercourse was a necessity for men and their health (Makepeace 2012). Some soldiers would frame their visits to the French brothels within the context of war as either providing reward for surviving or as a way of hiding from the spectre of death. Others may have frequented the brothels with the hope of acquiring a form of VD and therefore would have a legitimate reason to be removed from the front lines, at least for a time to seek treatment (Makepeace 2012). It is well documented that over 100,000 cases of acquired syphilis were treated among British troops during WWI (Hall 1993). Despite viable arsenic and mercury-based treatments being available, many were likely deterred by the treatment's side effects including jaundice and convulsions and there were no penalties if treatment was not sought after exposure (Beardsley 1976; Harrison 1995).

Initially, families were informed if a soldier was hospitalised with VD, including syphilis. However, this changed after the conscription of married men, and allegedly because of the reported suicide of an army major after his wife had been informed of his illness. For the remainder of the war, families were told simply that a diagnosis was yet to be made (Harrison 1995). The Cairo Purification Committee, a civil-military body appointed to examine how to reduce VD amongst the troops, continued to advocate that wives should be informed of their husbands' infection, to better protect themselves and any future children from infection. This advocacy was ignored, likely as army morale was considered of greater importance, and an infection with VD was one of the few available reasons that women could utilise to seek divorce (Makepeace 2012).

The taboos in publicly discussing VD likely resulted in many soldiers returning home and infecting their wives, who, if infected with syphilis, would then infect their unborn children. However, the risk and spread of congenital syphilis in connection to WWI was largely ignored by contemporary medical sources (Harrison 1954a; 1954b), and subsequently by military and medical historians studying sexual health during war (Beardsley 1976; Harrison 1995; Hall 1999; Frith 2012).

In 1921, the number of syphilitic admissions recorded in HHARP returned to pre-1918 levels. The admissions records for 1921 are seemingly complete as the total admissions for the year are comparable with the preceding years. It is logical that the decrease in admissions could reflect a fall in the number of syphilitic children needing admission. The Royal Commission on Venereal Disease (RCVD) (1913-1916), established by the government to investigate VD prevalence in the United Kingdom due to pressure from medical professionals, recommended that free treatment centres be established, with the first opening in 1917. The contemporaries of these centres testified to these being a success as the numbers of newly reported cases of syphilis would show a steady decline after the centre's opening (Evans 1992). This must be treated with a level of caution as these numbers do not necessarily represent the actual incidence of the disease, however, this does not negate the fact that there was a decline in deaths attributable to syphilis between 1917 and 1938 (Evans 1992). As such it is possible that parents of children diagnosed with congenital syphilis were themselves referred to these treatment centres, preventing future children from being infected. However, this theory could be better interrogated if admissions for the years after 1921 were available through HHARP.

Socioeconomic Status

The socioeconomic data present in the Booth Maps is representative of London over a 17-year period (1886-1903) within our 69-year study period (1852-1921). Although the socioeconomic status of these urban areas may have differed to that recorded during

Booth's data collection period, historical geographers have shown that once an initial socioeconomic pattern is established, the development history of an area is locked in place (Meen, Nygaard and Meen 2012). Indeed, it was only after the large-scale destruction of London by German air-raids during World War II (1938-1945) that large-scale urban changes would occur (Meen and Nygaard 2011). This is not to say there was no socioeconomic change on a geographic level during the late nineteenth and early twentieth centuries. While slum clearances did occur, these clearances and additions of new infrastructure would often merely compound the problem by reinforcing slums nearby as people moved from one to another (Dyos 1967; Yelling 1981; 1982). Due to the lack of any large-scale socio-geographic change occurring in London prior to WWII, the authors are confident that the Booth maps can still provide valid socioeconomic data for this study.

The lack of "upper class" admissions is likely because these individuals were not the intended demographic for the children's hospitals. These institutions were established to provide healthcare for those who could not normally afford it (Hawkins 2012). Indeed, the RCVD specifically noted that upper-class adults, and presumably their children, were able to receive treatment for syphilis from private practitioners (Hall 1999). However, the RCVD also noted that due to public taboo surrounding VD these individuals could still be misguided into seeking treatment for syphilis from unqualified sources (Royal Commission of Venereal Disease 1916). The low numbers of "middle class" admissions, may also be attributed to the same financial privilege of being able to pursue private treatment, rather than rely upon a charitable organisation. Considering the children from the upper class died during their admission, it may have been that children from more affluent families were sometimes admitted if they needed a level of care which exceeded that which could be provided within the home.

It is also possible that higher socioeconomic classes saw fewer cases of acquired, and later congenital syphilis, than the lower classes. During WWI the differences between army ranks, frequently correlated to socioeconomic status, was seemingly reflected in access to sex workers and contraception, as well as VD treatments. In the autobiography of Brigadier-General Frank Percy Crozier, it was noted that high-ranking officers who frequented "high-class" brothels would be provided with contraceptives; conversely these were not freely provided to lower ranking personnel who instead visited "lower-class" brothels or amateur prostitutes (Makepeace 2012). Also, whilst prophylactic packs were available to the soldiers, these frequently contained disinfectants rather than condoms (Hall 2013). Thus, whilst unwanted pregnancy was managed there was little protection against the spread of VD. Differences in treatment according to rank were also present, with higher ranking officers at Le Havre receiving 12 doses of arsphenamine whilst lower ranked soldiers received eight (Makepeace 2012). It cannot be shown that this was a universal treatment plan, but it may well have led to fewer members of the upper classes returning from the war with transmittable cases of syphilis. However, little is written focusing on Victorian and Edwardian upper-class sexuality, so there is an element of conjecture to much that is proposed here.

The lack of the lowest classes ("lowest class"; "very poor"; "poor") is unexpected as these were the classes the children's hospitals were ostensibly created to aid. It is possible that this lack of admissions is reflective of the views held about the poor by the higher classes during the examined period. The Victorians had a highly developed commitment to philanthropy, and considered it highly commendable to help the poor, though this was not always without conditions (Steinbach 2017). Whilst the children's hospitals had to maintain an appearance of care and competency for the patients and their relatives, the hospitals also had to show their financial backers that they were providing the moral education that lower-class families failed to provide (Tanner and Hawkins 2013). Charitable hospitals would therefore provide care to those deemed to be the "deserving poor" (Marland 1991). These individuals were those deemed to be deserving of help by those who provided aid, whether this be help from sickness or poverty (Grell and Cunningham 2017). Below the "deserving poor" were those deemed undeserving of aid because they were seen as being able to work but chose not too (Grell and Cunningham

2017), and the "criminal classes" who were deemed too degenerate to be lifted from their squalor (Dyos 1967).

The lack of consideration for those outside of the "deserving poor" can certainly be seen in the first epidemiological study of congenital syphilis in London. Fildes (1915) examined a one-mile radius around the Royal London Hospital, an area which, according to Simms et al's (2018) meta-analysis using the Booth Maps, included socioeconomic classes ranging from the lowest class to the middle class. However, Fildes only invited married couples from the "respectable" labouring classes to take part and ignored many of the most destitute areas as well as sex workers (Simms et al 2018). This is concerning, as it is these lowest class individuals who bore the brunt of congenital syphilis' impact. Harman (1916) found that syphilitic mothers would have 1.5 times more pregnancies than healthy mothers, whilst also being 3.5 times more likely to experience a pregnancy ending in miscarriage, stillbirth, infant death, or congenital syphilis. Thus, whilst the upper levels of the working class may have been the deserving poor that the medical establishment sought to help, it appears the lower levels of Booth's socioeconomic hierarchy were deemed to be outside of this designation.

It is also possible that the poorest members of society were refused admission or opted for their children to be treated as outpatients. Not enough syphilitic children are present in the refusals data for a case to be made for the former and it is not possible to test the latter as no outpatient data is available through HHARP. Though, with GOSH having 20,000 outpatients yearly at the end of the nineteenth century, compared to approximately 2,000 inpatients (Hawkins 2012) it is a plausible possibility.

The Possibility of Acquired Syphilis

During this investigation, the authors encountered an article (Anon 1880) which outlined three cases of tertiary syphilis among GOSH patients, none of whom were present in the HHARP admissions. Due to the lack of detailed symptom information in HHARP it was not possible to undertake a detailed analysis of whether a child experienced congenital or acquired syphilis.

The majority of the standardised diseases within the HHARP database were recorded as "congenital syphilis" (76.3%), and the remaining were recorded simply as "syphilis". Some of these are clearly due to transcription errors as several of the diseases as recorded in the admissions registers are "cong. Syphilis". However, amongst the admissions listed simply as syphilis there is one diagnosis of "syphilis (tertiary)" in the admissions register, and 41 mentions of gummas, the sores associated with tertiary syphilis. Of these, eight were recorded as being present alongside congenital syphilis. This is a possibility as gummas may occur in late congenital syphilis (Dobson and Sánchez 2019). Regardless, this leaves 33 children recorded as having gummas but not congenital syphilis, including gummas on the frontal bone (*caries sicca*) and around the groin and genitals.

If children in the present day were seen by a physician and presented with symptoms that could be attributed to acquired syphilis, and there was no satisfactory alternative explanation then it would be assumed that this was a sign of child abuse and reported as such (Dobson and Sánchez 2019; Baker 2020). Whilst not pleasant to dwell upon, this behaviour has happened throughout history. Bates (2016) examined almost 3,000 pre-trial statements from the Middlesex and the Gloucestershire, Somerset, and Devon court sessions from 1850 to 1914. In response to medical testimony outlining how a 10-year-old girl had acquired syphilis after an assault, a judge opined that the pollution of a child of tender years was a crime that no language could describe (Bates 2016). Beyond the trauma of the event itself, and the medical consequences of the syphilis, the abuse would have social implications for the child as well. Any child who had been sexually abused was seen as being corrupted with sexual knowledge, leading to segregation from their peers to prevent the spread of this corruption (Cook 2004).

Jackson (2000) tried to argue that due to the prevailing culture of the time, there was a reluctance amongst doctors to attribute syphilitic transmission in children to a sexual origin. However, Bates (2016) found only three doctors who raised the possibility of an "innocent transmission" due to poor hygiene, and none denied the possibility that transmission could corroborate

charges of sexual assault. Innocent transmission may certainly have occurred, as the survival rate of *T. pallidum* outside of the body, whilst only several hours, would be long enough to be passed on in conditions of poor hygiene. Indeed, one of the most common hypothetical situations presented for innocent transmission was that of a mother with a syphilitic sore around her mouth using the same spoon to feed herself and her child. However, such an explanation would not explain syphilitic symptoms upon the genitals (Taylor 1985) and within the HHARP data there were several occurrences of syphilitic gummas around the groin. Whilst this study raises the possibility of these children suffering from acquired syphilis rather than congenital, it is impossible for researchers to know the true extent of this within the past because of its social taboo both past and present.

Limitations of HHARP

With any archival data researchers are limited to the information that is present in the archive, and in this case that which has been digitised from the physical archive itself. In the HHARP data there was no additional information regarding symptoms beyond the diagnosed disease, and there was limited post-mortem information available. As such, no comment could be made regarding the prevalence of the different symptoms possible within cases of congenital syphilis, and it was not possible to examine whether congenital syphilis or a concurrent condition was more likely to cause the death of a child after admission. Additionally, despite the volunteers who transcribed the hospital admissions being provided with training and reference guides of health terms and geographic areas of London, we cannot exclude the potential for human error leading to information being missed or inaccurately transcribed. However, the project did include proofreading and data validation procedures, so effects should be minimal.

Conclusion

This investigation provided a glimpse into the occurrence of syphilis within London's children's hospitals through the mid-nineteenth and early twentieth centuries. Some children were able to be taken to the hospitals from within the London area and further afield to receive care both as outpatients and inpatients. However, though these hospitals were established to help the poor, the poorest children of London society were not clearly visible within those admitted, though the reason for this remains obscured. We also saw that those in positions of power, to a certain degree, preferred to prioritise the sexual needs of men, during both peace and war, in such a way as to promote damage, both physically and mentally, to women and their children due to syphilitic exposure. This was deadly to children, and women (regardless of whether they were mothers) when combined with the growing culture of taboo when discussing sexuality and more specifically sexual health during the period this paper examined. This paper also highlighted that, although untasteful, it is important to raise the possibility of acquired syphilis when looking at archival data surrounding childhood syphilis. Though the presence of acquired versus congenital cannot be proven with certainty, this was a possible reality for some children in the past and it must be considered during discussions of this disease.

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References

Adams, J. (2004). Victorian sexualities. In H. Tucker, (Ed.), A new companion to Victorian literature and culture. (pp. 124-137). Chichester: John Wiley & Sons. DOI:10.1002/9781118624432.ch9

Anonymous. (1880). Reports of medical and surgical practice in the hospitals and asylums of Great Britain and Ireland. The Hospital for Sick Children, Great Ormond Street. Three cases of late or tertiary syphilis in children (under the care of Dr. Cheadle). The British Medical Journal 1, 204-5.

Aufderheide, A.C., & Rodrígues-Martín, C. (1998) The Cambridge encyclopedia of human paleopathology. Cambridge: Cambridge University Press

Baker, C. (2020). Red book atlas of pediatric infection diseases 4th edition. Itasca, Illinois: American Academy of Pediatrics

Bates, V. (2012). 'Not an exact science': Medical approaches to age and sexual offences in England, 1850-1914. PhD diss., University of Exeter.

Beardsley, E. (1976). Allied against sin: American and British responses to venereal disease in World War I. Medical History 20, 189-202. DOI: 10.1017/S002572730002224

Bevir, M. (2001) The Long Nineteenth Century in Intellectual History. Journal of Victorian Culture. 6(2), 313-335. DOI: 10.3366/jvc.2001.6.2.313

Charles Booth's London Poverty maps and police notebooks (2016) available at: booth.lse.ac.uk

Cole, G., Waldron, T., Shelmerdine, S., Hutchinson, S., McHugh, K., Calder, A., & Arthurs, O. (2020). The skeletal effects of congenital syphilis: the case of Parrot's bones. Medical History 64, 467-477. DOI: 10.1017/mdh.2020.41

Cook, H. (2004) The Long Sexual Revolution: English Women, Sex, and Contraception 1800 – 1975. New York: Oxford University Press

Dayan, L., and Obi C. (2005) Syphilis treatment: old and New. Expert Opinion on Pharmacotherapy. DOI: 10.1517/14656566.6.13.2271

Dittmar, J., and Mitchell, P. (2016) From cradle to grave via the dissection room: the role of foetal and infant bodies in anatomical education from the late 1700s to early 1900s. Journal of Anatomy. 229(6), 713-722. DOI: 10.1111/joa.12515

Dobson, S., and Sánchez, P. (2019). Syphilis. In: J. Cherry, G. Harrison, S. Kaplan, W. Steinbach, & P. Hotez (Eds.), Feigin and Cherry's textbook of pediatric infection diseases eighth edition (pp. 1268-1284.e3). Philadelphia, Pennsylvania: Elsevier

Dyos, H. (1967). The slums of Victorian London. Victorian Studies 11, 5-40.

Evans, D. (1992). Tackling the 'hideous scourge': The creation of the venereal disease treatment centres in early twentieth-century Britain. Social History of Medicine. 5, 413-433. DOI:10.1093/shm/5.3.413

Fildes, P. (1915). The prevalence of congenital syphilis amongst the newly born of the east end of London. Journal of Obstetrics and Gynecology 27, 124-137. DOI: 10.1111/j.1471-0528.1915.tb05947.x

Frith, J. (2012) Syphilis – its early history and treatment until penicillin, and the debate on its origins. Journal of Military and Veterans Health. 20(4), 49-58. Available at: https://jmvh.org/article/syphilis-its-early-history-and-treatment-until-penicillin-and-the-debate-on-its-origins/

Grell, O. and Cunningham, A. (2017) Health Care and Poor Relief in 18th and 19th Century Northern Europe. In: Grell, O., Cunningham, A., and Jütte, R. (Eds) Health Care and Poor Relief in 18th and 19th Century Northern Europe. Abingdon, United Kingdom: Routledge

Hall, L. (1993) "The Cinderella of Medicine": Sexually-Transmitted Diseases in Britain in the Nineteenth and Twentieth Centuries. Genitourinary Medicine. 69, 314-319. DOI: 10.1136/sti.69.4.314

Hall, L. (1999). 'War always brings it on': War, STDs, the military and the civilian population in Britain, 1850-1950. In R. Cooter, M. Harrison, & S. Sturdy (Eds.) Medicine and modern warfare (pp. 205-223). Atlanta, GA: Brill. DOI: 10.1163/9789004333277_009

Hall, L. (2013) Sex, gender and social change in Britain since 1880. 2nd edition. Basingstoke: Palgrave Macmillan.

Harman, N. (1916) The influence of syphilis on the chances of progeny. British Medical Journal 1, 196-197. DOI: 10.1136/bmj.1.2875.196

Harrison, L. W. (1954a). Some lessons learnt in fifty years' practice in venereology. British Journal of Venereal Diseases 30, 184-190. DOI: 10.1136/sti.30.4.184

Harrison, L. W. (1954b). Ehrlich versus syphilis as it appeared to L. W. Harrison. British Journal of Venereal Diseases 30, 2-6. DOI: 10.1136/sti.30.1.2

Harrison, M. (1995). The British army and the problem of venereal disease in France and Egypt during the First World War. Medical History 39, 133-158. DOI: 10.1017/S0025727300059810

Hawkins, S. (2012). The Historic Hospital Admissions Registers Project: A unique new online resource for historians of child health. Local Population Studies 89, 82-90.

Heywood, C. (2017) A history of childhood. Cambridge: Polity.

Hirst, C. (2018). HHARP: The Historical Hospital Admission Records Project – A review. Internet Archaeology 47. DOI: 10.11141/ia.47.6

Historic Hospital Admission Records Project (HHARP) (2010) Available at: hharp.org

Jackson, L. (2000). Child sexual abuse in Victorian England. London: Routledge.

Keen, P. (1953) Potassium Iodide in the Treatment of Syphilis. British Journal of Venereal Diseases. 29(3), 168-174. DOI: 10.1136/sti.29.3.168

Lewis, M. (2007) The Bioarchaeology of Children. Perspectives from Biological and Forensic Anthropology. Cambridge: Cambridge University Press

Lewis, M. (2018). Paleopathology of children: identification of pathological conditions in the human skeletal remains of non-adults. London: Academic Press.

Lewis, M. (2019). Children in bioarchaeology: Methods and interpretations. In M.A. Katzenberg, & A. Grauer (Eds), Biological anthropology of the human skeleton (pp. 119-44). Hoboken, NJ: John Wiley & Sons

Makepeace, C. (2012). Male heterosexuality and prostitution during the Great War. Cultural and Social History 9, 65-83. DOI: 10.2752/147800412X13191165982999

Marland, H. (1991). Lay and Medical Conceptions of Medical Charity during the Nineteenth Century: The case of the Huddersfield General Dispensary and Infirmary. In: Barry, J. and Jones, C. (Eds) Medicine and Charity before the Welfare State. (pp. 149-171). London: Routledge.

Meen, G., & Nygaard, C. (2011). Local housing supply and the impact of history and geography. Urban Studies 48, 3107-3124. DOI: 10.177/0042098010394689

Meen, G., Nygaard, C. and Meen, J. (2012). The cause of long-term neighbourhood change. In: van Ham, M., Manley, D., Bailey, N., Simpson, L. & MacLennan, D. (Eds.), Understanding neighbourhood dynamics (pp. 43-62). Dordrecht: Springer. DOI: 10.1007/978-94-007-4854-5_3

Parrot, M. J. (1879) The Osseous lesions of Hereditary Syphilis. The Lancet. 2907, 696-698. DOI: 10.1016/S0140-6736(02)35509-0

Patel, R. and Mitchell, P. (2007) The Search for Rosa Pike: congenital syphilis in 1880s London. In: Zakrzewski, S. and White, W. (Eds) Proceedings of the Seventh Annual Conference of the British Association for Biological Anthropology and Osteoarchaeology. Oxford: Archaeopress. 49-53.

Roberts, C., & Buikstra, J. (2019), Bacterial infections. In: J. Buikstra (Ed.), Ortner's identification of pathological conditions in human skeletal remains (pp. 321-420). London: Academic Press.

Royal Commission of Venereal Disease (1916) Final Report Cd 8189, §133, §188.

Savage, G. (1990). 'The wilful communication of a loathsome disease': Marital conflict and venereal disease in Victorian England. Victorian Studies 34, 35-54.

Simms, I., Goh, B., French, P., Wallace, L., Irvine, N., Thomas, D., Winter, A., Lyall, H., & Webb, S. (2018). A brief recent history of the epidemiology of congenital syphilis in the United Kingdom. International Journal of STD & AIDS 29, 1110-1119. DOI: 10.1177/0956462418776070

Steinbach, S (2016) Understanding the Victorians: Politics, culture and society in nineteenth-century Britain 2nd Edition. London: Routledge.

Tampa, M., Sarbu, I., Matei, C., Benea, V., and Georgescu, S. R. (2014) Brief History of Syphilis. Journal of Medicine and Life. 7(1) 4-10.

Tanner, A., & Hawkins, S. (2013). Myth, marketing and medicine: Life in British children's hospitals 1850-1914. In: L. Abreu, & S. Sheard (Eds.), Hospital life: Theory and practice from the medieval to the modern (pp. 209-236). Bern: Peter Lang.

Taylor, K. (1985). Venereal disease in nineteenth-century children. The Journal of Psychohistory 12, 431-64.

Townsend, J. (2018). Marriage, motherhood, and the future of the race: Syphilis in late-Victorian and Edwardian Britain. In K. Nixon, & L. Servitj, (Eds.), Syphilis and subjectivity: From the Victorians to the present (pp. 67-89): Cham, Switzerland: Palgrave Macmillan. DOI: 10.1007/978-3-319-66367-8_4

Waldron, T. (2007). Palaeoepidemiology: The epidemiology of human remains. Walnut Creek, California: Left Coast Press.

Waldron, T. (2009). Palaeopathology. Cambridge: Cambridge University Press.

Walker, D. (2012) Disease in London, 1st – 19th Centuries. London: Museum of London Archaeology.

Walker, D., Powers, N., Connell, B., and Redfern, R. (2015) Evidence of skeletal treponematosis from the medieval burial ground of St. Mary Spital, London, and implications for the origins of the disease in Europe. American Journal of Physical Anthropology. 156(1), 90-101. DOI: 10.1002/ajpa.22630

Wijesooriya, S., Rochat, R., Kamb, M., Turlapati, P., Temmerman, M., Broutet, N., and Newman, L. (2016) Global burden of maternal and congenital syphilis in 2008 and 2012: a health systems modelling study. The Lancet Global Health. 4(8), e525-e533. DOI: 10.1016/S2214-109X(16)30135-8

Woods, C. (2005). Syphilis in children: Congenital and acquired. Seminars in Pediatric Infectious Diseases 16, 245-257. DOI: 10.1053/j.spid.2005.06.005

Yelling, J. (1981). The selection of sites for slum clearance in London, 1875 – 1888. Journal of Historical Geography 7, 155 – 165. DOI: 10.1016/0305-7488(81)90118-3

Yelling, J. (1982). L.C.C. slum clearance policies, 1889-1907. Transactions of the Institute of British Geographers 7, 292-303. DOI:10.2307/621992