INFANT MORTALITY IN MID-NINETEENTH CENTURY SOUTHERN ONTARIO

INFANT MORTALITY IN MID-NINETEENTH CENTURY SOUTHERN ONTARIO: DUNDAS AND STAMFORD TOWNSHIPS

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Abstract

Parish records from the All Saint's Anglican Church (Stamford, Ontario) and St. James' Anglican Church (Dundas, Ontario) were analysed in order to determine whether parish records may be used to accurately reconstruct the health of pre-census populations in mid-nineteenth century Southern Ontario. The records are analysed using a protocol developed by Drake (1974), and were found to have problems related to the small number of individuals recorded within both sets of records. In addition, both sets of records showed a lack of consistency in record keeping throughout the time period studied. The data from the All Saint's Church demonstrated greater continuity and homogeneity than the data from the St. James' Church. Quantitative analysis of both parishes indicated that the data from the St. James' Church was seriously biased due to missing records and gaps in the recorded data. In contrast to the results obtained from the St. James' parish, the results of the analyses of the All Saint's Church data were consistent with similar studies performed in parishes in Southern Ontario and the Northern United States for the same time period. The results of this study suggest that while parish records may be a useful source of data for providing insight into the health and well-being of pre-census communities, it is important to be aware of possible biases in the data which may result from incomplete records, small sample sizes and under-registration.

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Introduction

The health of past populations can be difficult to determine, unless one is presented with accurate and detailed historical records and complete skeletal samples. Unfortunately this rarely occurs, and researchers must find new ways to search for information that will help to answer their questions. Parish record analysis has been shown to be an effective way to obtain information on past lifestyles and the health of historical populations (Wrigley, 1977; Saunders, Herring and Boyce, 1995; Moffat, 1992). It has been demonstrated that "levels of infant and childhood mortality are a good index of a group's ability to manage its social and physical environment" (Swedlund and Ball, n.d.:6). Specifically, studies of infant mortality, as determined through parish records, have been found to be important indicators of socio-economic conditions, technological developments and health care in communities (Klein, 1980; Trapp et al, 1983).

Studies such as these are useful for showing changes in morbidity, mortality, seasonal patterns of disease, and may also indicate different infant feeding practices within a community. Infant mortality rates may be influenced by many factors among which are: environmental stresses, low socio-economic levels, poor sanitation, differential access to health care and feeding methods, all of which influence the health status of the community. Even when cultural differences are taken into consideration, the effects of poor socio-economic status can be quite profound (Herring and Sawchuk, 1986).

All of these issues are what makes demographic analysis a useful tool for anthropologists interested in the relationship of social structure and ecological factors (Gage, 1985). As well, demography is an ideal way to study the inter-relations of small groups of individuals which are generally focused on by anthropologists. By learning about the birth, marriage and death of individuals within a community we can learn a great deal about a population's household and family composition, economic organization, social problems and even its political structure (Howell, 1986). As the study of infant mortality is a useful tool for determining health and socio-economic levels in a community, and can add to knowledge of household and community well-being, it can be seen to be a valuable tool for the anthropological analysis of a community.

Information concerning the health of settlers in mid-19th century southern Ontario is somewhat restricted as civil registration did not begin until July 1, 1869 (Saunders, Herring, and Boyce, 1995). The information which exists, although limited, has not been widely studied. Historical records are often inadequate for creating a complete picture of health, many churches parish records are missing, others may be biased as a direct result of the record keeping process, or simply due to historical forces. As well, little data exists concerning the health of infants and children (Drake; 1974, Sorg and Craig, 1983; Nault, Desjardins and Légaré, 1990:275; Haines, 1993: 33; Herring, Saunders and Katzenberg, n.d.). This study aims to show that parish record analysis is a useful tool for the analysis of infant mortality for mid-nineteenth century Southern Ontario. Due to this, parish record analysis can also be a useful method for determining health in past populations.

It is hoped that by focusing on infant health in the mid-19th century researchers may achieve some understanding of the lifestyles of these early settlers. Studies of other Southern Ontario communities, as well as the United States, from similar historical backgrounds and covering the same time period, could aid in determining possible causes of bias in data, as well as confirm observations from this study about infant health and the general well-being of 19th century communities.

This study uses parish records from four Anglican churches, not only to question the possible value of parish records for this type of analysis, but also to apply this method in attempts to further explore the question of infant mortality in Southern Ontario in the mid-nineteenth century.

The reliability of this type of analysis was studied through an examination of the quality and the representativeness of parish records from St. James' Anglican Church in Dundas, Ontario, St. John's Anglican Church in Stamford, Ontario, St. George's Anglican Church in Drummondville, Ontario and All Saint's Anglican Church, in Niagara Falls, Ontario for the period 1850-1889. The records for St. George's and St. John's are incorporated in the All Saint's records as these two neighbouring church parishes, both of which were administered by the same rector in the 1800's, were actually combined into one church, All Saint's, in the mid-1800's. The results from these records will be compared to previous studies of 19th century North American communities, including St. Thomas' Anglican Church in Belleville, Ontario (Herring, Saunders and Katzenberg, n.d.; Saunders, Herring and Boyce, 1995; Saunders, Herring, Sawchuk and Boyce, 1994;

Moffat, 1993; Herring, Saunders and Boyce, 1991), the Upper St. John Valley (Sorg and Craig, 1983), Chappell Hill, Texas (Boatler, 1983), to name a few.

This study uses parish histories, newspapers and government documents (census data) in order to increase our understanding of social, economic and environmental factors which may have influenced infant mortality during this time period. This thesis is organized into six chapters. Chapter Two deals with the history of the Niagara district, as well as the history of the towns and parishes used in this study. Chapter Three presents and evaluates the various materials, such as the parish records, for both the All Saint's Church and the St. James' Church. This chapter will use a protocol developed by Drake (1974) in order to determine the consistency and quality of the data by scrutinizing the records for appropriate sample sizes, looking for long gaps in the recorded information, determining the extent of the community which is represented, and evaluating the reliability of those recording the data for both parishes. The fourth chapter uses quantitative methods for the analysis of aggregate information gathered for this study. This includes analysing the mean number of days between birth and baptism, determining the extent of private baptisms, and analysing the differences between linked and unlinked burial records for both churches studied. Chapter Five focuses on the results of the aggregate analysis, looks at the infant mortality rates for both parishes, analyses the results of the biometric analysis of the infant mortality rates, and discusses causes and seasonality of death for both the All Saint's and St. James' parishes. Finally, Chapter Six consists of a discussion of the findings of this study, compares the results of this analysis to other

studies from the mid-nineteenth century Southern Ontario and the United States, and presents final conclusions synthesizing the results of the analysis.

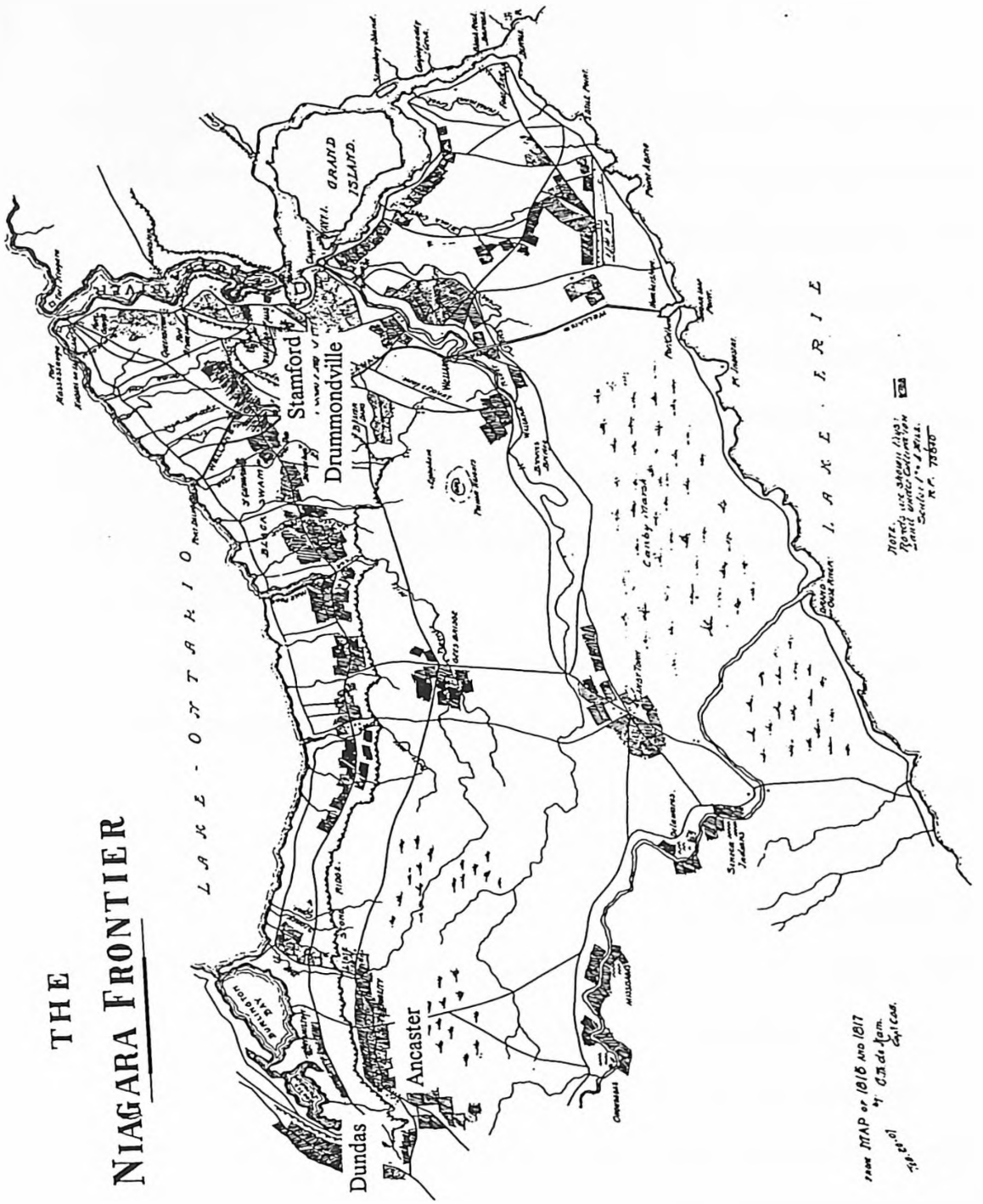
Chapter 2

History of the Region

The area surrounding the Niagara region was formed more than 30,000 years ago due to large glacial movements (Woodhouse, 1965: 2). Rivers forming under the ice gouged out underlying rocks, creating large features still visible today, such as the Dundas Valley and the Niagara Escarpment. The pressures of the Wisconsin Glacier and the encroaching St. Lawrence Lowlands formed much of the region of Southern Ontario today, and greatly affected the history of the region and its settlers. (Allen as cited in Whitfield, 1986).

The climate of the area at the time of European settlement in the late 18th and early 19th century was influenced by the proximity of Lake Erie and Lake Ontario, as well as the protection afforded by the escarpment and its latitude (43 N), all of which result in a reasonably mild climate. The forests of the region were characterized by many varieties of trees which included maple, birch, beech, oak, pine, cedar and various evergreens. Much of the Niagara area was surrounded by excellent agricultural land, and is still well known for the large varieties of fruits which can be grown, such as grapes for food and wine, peaches, and plums (Newcombe, 1972). Animal life at the time of European settlement included the bear, beaver, wolf, elk, deer, wild-cat and rattlesnake, and Lake Ontario was known for its abundant supply of salmon, whitefish, herring, sturgeon and many other edible fish (Whitfield, 1986; Lundy's Lane Historical Society, 1967).

The region of land surrounding the Niagara Peninsula (Map 1), was a prized



Map 1. Map of the Niagara Region, showing Dundas, Drummondville and Stamford in relation to the surrounding topography (Whitfield, 1986).

location for hunting and fishing for various native North American Indian tribes prior to the arrival of European immigrants in the mid-1700's (Lundy's Lane Historical Society, 1967: 6). Records for the region show that the area was formerly occupied by a tribe of Neutral Indians, so called due to their stance in the war between the neighbouring tribes of the Huron and Iroquois. The Neutrals in the area were vanquished in 1649 by the Senecas, who were later replaced by Mississauga Indians infiltrating the hunting grounds from the Manitoulin Island area (Woodhouse, 1965). It was from the Mississauga Indians that the British bought the Niagara Peninsula for its colonists in the late 1700's (Lundy's Lane Historical Society, 1967).

These settlers were not the first Europeans in the region, as reports from missionary attempts to Christianize the Neutrals as early as the 1600's have been documented. The writings of Father Louis Hennepin and Father La Motte, who were both members of La Salle's exploration party (Petrie, 1977) document these early contacts. Father Hennepin was a Flemish friar of the Order of St. Francis, and the first European to set foot on what came to be known as Niagara Township (Rennie, 1967). From his writings come the first descriptions of the cataracts and falls at Niagara.

Later, migration to this region was initiated by the American Revolution (1775-1783) (Petrie, 1977). Great numbers of United Empire Loyalists (UELs) made their way north to settle in Canada. The victory of the rebels against the British Crown in 1781, which was sealed by the Treaty of Versailles in 1783 (Lundy's Lane Historical Society, 1967), meant that large numbers of Loyalists had to find new places of residence.

Many of the UELs settled near the mouth of the Niagara river, and as this area filled, further explorations and settlements inland occurred. Land for settlement on the West bank of the Niagara River was secured by Indian treaties in 1764, 1781, and again in 1784 (Petrie, 1977).

Soldiers fighting for the Crown were given the first choice of land, as well as receiving 100 free acres from the Crown for their services during the war. Land grants were also given to non-military loyalists who were seen to be men of education, merchants or professionals (Widdis, 1991). Additional waves of settlement occurred after the War of 1812, helping to further develop the region. These were mostly American settlers, or "Late Loyalists", although there were also many British immigrants settling into the region (Saunders et al., 1995; Vanderlinden, 1995).

It was in this political framework that the towns of Dundas, Stamford, and Drummondville were established, founded by UEL refugees. The town of Belleville was also populated by UEL refugees, and as it lies outside of the Niagara district, serves to provide an ideal sample for comparison. Thus, all four areas in the sample were populated with immigrants from similar historical, social, ethnic and religious backgrounds.

The Communities

1. Dundas

After the American Revolution in 1776, Loyalists filled the land surrounding the Niagara peninsula at a rate faster than it could be surveyed, and new lands were increasingly necessary to open up to the rapidly migrating settlers (Dundas Historical Society, 1965). Often families set out on their own, attempting to claim lands not yet surveyed or granted by the crown, essentially acting as "squatters" until negotiations were made with the government for the land. By 1787, one family had reached the then unsurveyed lands of the Dundas Valley (Woodhouse, 1965). By 1789, 22 families had made their residence in what is now Ancaster (Map 1), but it was not until 1793 that a formal survey of the region was performed (Woodhouse, 1965). This allowed these families to formally claim the lands upon which they had settled.

The first harvest in Dundas was performed by the Morden family in 1788, considered to be the "hungry year" due to an unusually hot summer which destroyed many crops (Woodhouse, 1965). As no industry existed in this region at this time, it was necessary to process the grain harvest by crushing it against rocks. In 1791 a saw and grist mill were built in neighbouring Ancaster, and in 1804 the first mills were built in the Dundas Valley (Woodhouse, 1967).

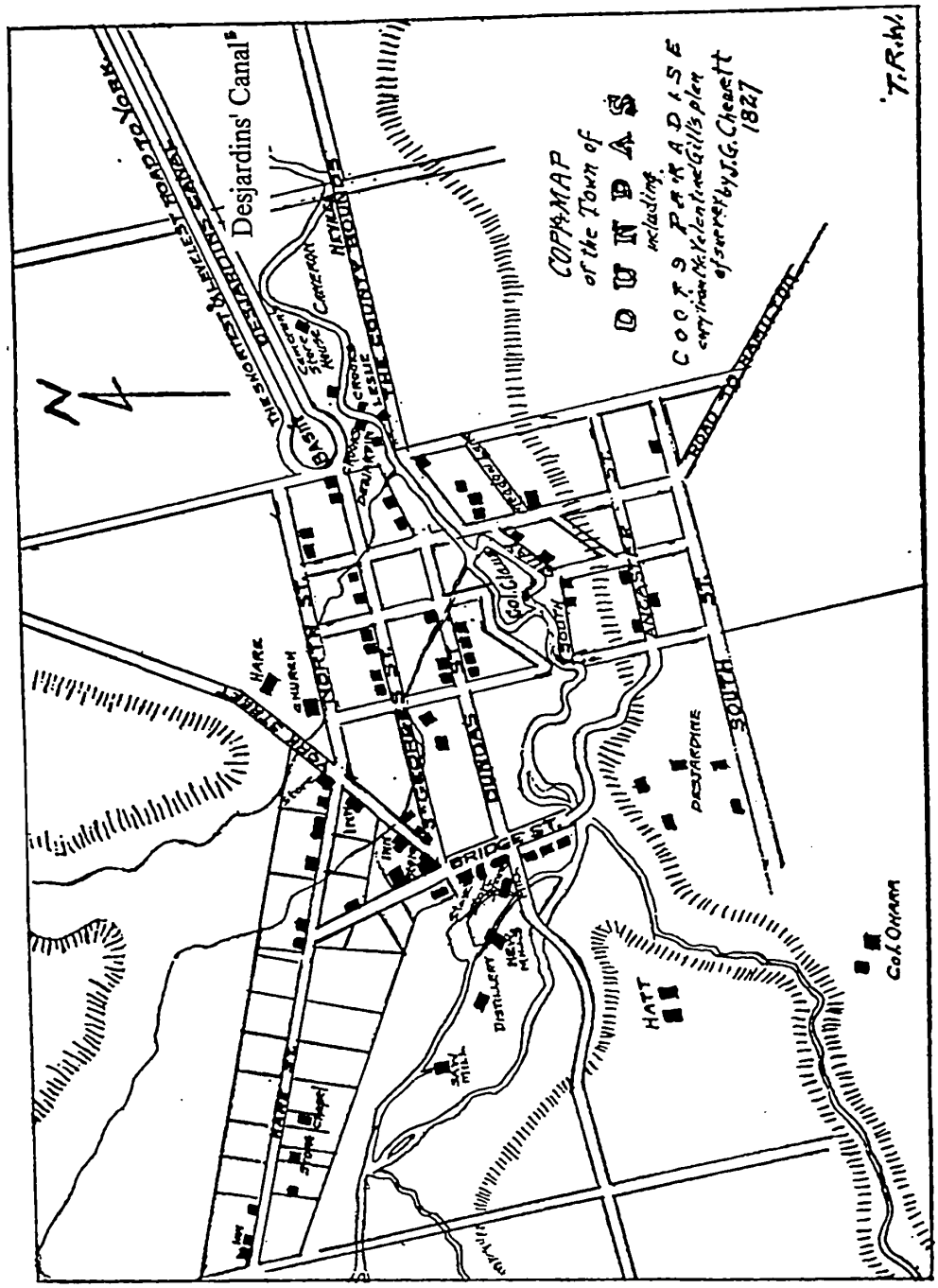
Water played an important role in Dundas' history, as water power and water transportation were important resources not only for Dundas, but for the surrounding townships as well (Woodhouse, 1965). Due to the easy access to water and water power,

Dundas quickly surpassed other nearby communities in its production and distribution of goods. The expansion of the Burlington Beach Canal allowed large boats to enter Burlington Bay, thus increasing commerce in the Hamilton region. Of great significance to the town of Dundas was the opening of Peter Desjardin's Canal in 1827, which ran from Burlington Bay to Dundas, and served to bring the increased prosperity of the region closer to the town (Map 2) (Woodhouse, 1967).

As manufacturing and logging capabilities increased within Dundas, the building of the Grand Trunk Railway (GTR) proved to be vital for the transportation of goods. This increased Dundas's abilities to distribute goods, above and beyond what was possible with waterways and canals alone (Newcombe, 1972). In accordance with this increase in industry, the population of Dundas doubled from 580 to 1200, between the years of 1830 and 1839 (Woodhouse, 1967), and reached approximately 3133 by 1871.

2. Stamford

Stamford was the second Township in the District of Niagara to be surveyed for allotment for the many families of UEL's entering the district, preceded only by Niagara itself (Map 1,3). The town of Stamford was first settled in 1782, and by 1783 ten more families had reached this area (Petrie, 1977). The population of the town of Stamford increased rapidly, especially as surrounding townships, such as Niagara, quickly filled up with settlers. Industry began arriving in 1786, when the first saw and grist mills were



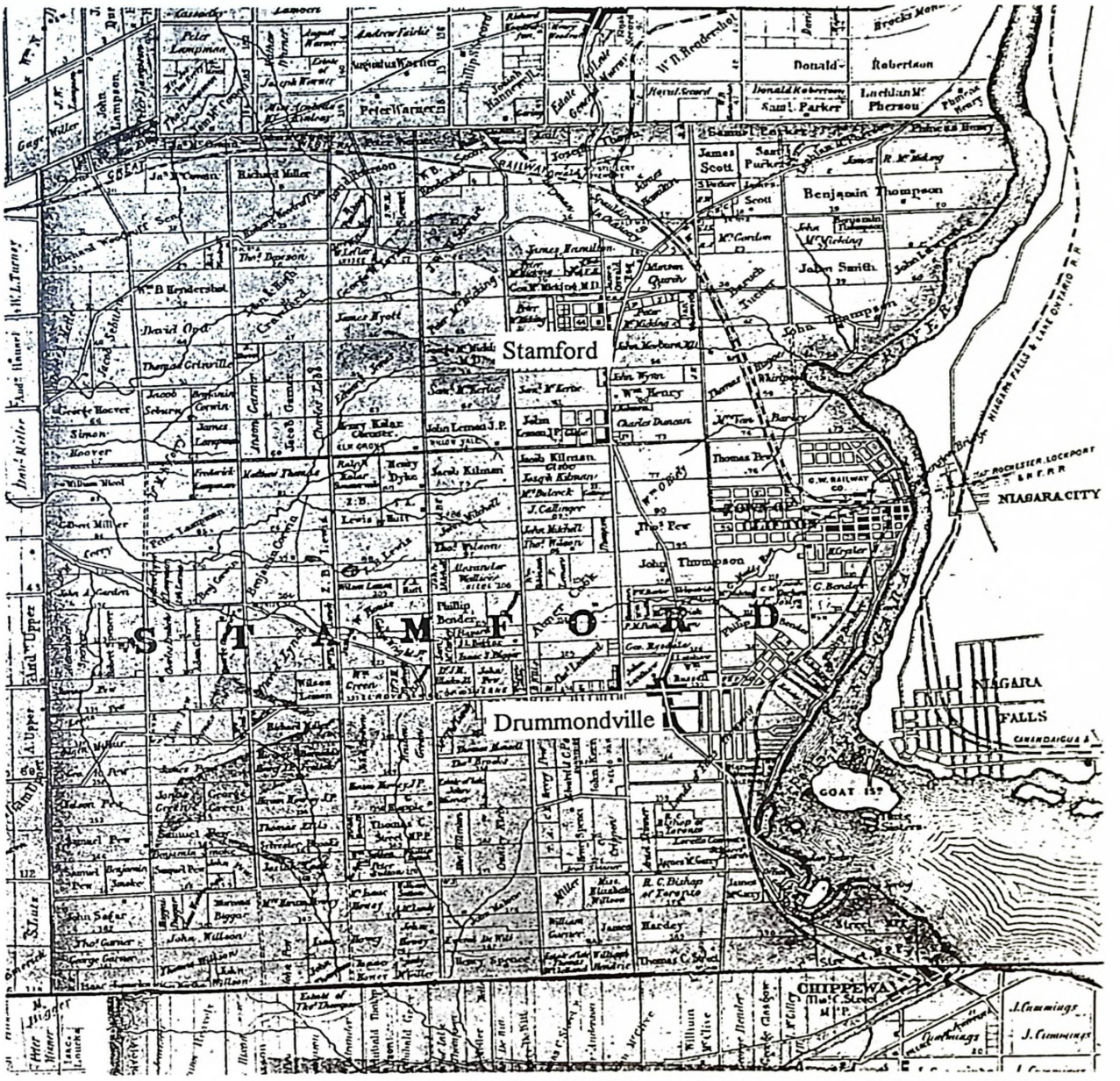
Map 2. Earliest known map of Dundas (Woodhouse, 1967)

built, giving the settlers some autonomy from the larger Niagara Township (Petrie, 1977).

The town of Stamford was previously called Mount Dorchester, after the Governor General of Canada, Lord Dorchester, and did not receive the name Stamford until 1792 (Petrie, 1977; Lundy's Lane Historical Society, 1967). It was while opening the first parliament in the new province of Upper Canada that Lieutenant-Governor Simcoe changed Mount Dorchester's name to Stamford after Stamford in Lincolnshire, England (Lundy's Lane Historical Society, 1967). The Portage Road between Queenston and Chippawa played an important role in developing commerce and trade as Stamford was an important stop on its route. Stamford Township also has the distinction of being one of the first townships to set up a municipal form of government, after the appointment of parish and township officers by Lieutenant-Governor Simcoe in 1793 (Lundy's Lane Historical Society, 1977). Stamford was a relatively self-governing township until it became a part of the City of Niagara Falls in January, 1963 (Lundy's Lane Historical Society, 1967).

3. Drummondville

Similar to Stamford, Drummondville began to grow as a town with the establishment of the Portage Road between Queenston and Chippawa. The area surrounding Portage Road was active with boats and carriages conveying trade items as this was the only way to transport goods between Lake Erie and Lake Ontario, prior to the building of the Welland Canal. With the declaration of neighbouring Queenston as an



Map of Stamford Township in 1862, showing land owners.

Map 3. Stamford and Drummondville (Petrie, 1977)

official port, traffic through Drummondville increased substantially. The stage coach also made frequent stops in Drummondville on its journey between Chippawa and Queenston, increasing the flow of people into the area.

In many old records "Drummondville" is often referred to as the village of "Lundy's Lane", but this changed to "Drummond Hill" after the historic battle on the hill in 1814. It wasn't until 1831 that the name "Drummond Hill" was replaced with the name "Drummondville" (Lundy's Lane Historical Society, 1967). The Drummondville of 1846 was a small town with approximately 130 inhabitants. By 1850 this number had increased to approximately 500 people, attesting to the rapid growth occurring in mid-19th century Southern Ontario (Lundy's Lane Historical Society, 1967:15). Drummondville was incorporated into the Village of Niagara Falls in 1882, and became part of the city of Niagara Falls in 1904 (Lundy's Lane Historical Society, 1967:15).

The Parishes

1. Dundas

The Reverend John Stewart came to Canada in 1781 and was the first clergyman in the area, until his replacement by Reverend Robert Addison in 1812 (Gilman, 1963). During the next few decades, several reverends ministered to Dundas and the surrounding areas. Reverend William McMurray, appointed to the towns of Ancaster, Hamilton and Dundas in 1838, was the first to set up residence in Dundas, due to its larger population

(Dundas Historical Society, 1965). During his stay in Dundas steps were finally taken to erect an Anglican church, as, prior to this, all services for all denominations took place in a building called the Free Church. St. James' Church, on Hatt Street, opened up on December 31, 1848, and was used until September 5, 1926, when it was taken down due to the encroaching arms factories built during the First World War (Gilman, 1963). McMurray resigned by 1857 to take a post as rector of Niagara-on-the-Lake, and was replaced by Reverend Featherstone Osler, a native of England, who was inducted rector of Ancaster and Dundas on October 20, 1857 (Gilman, 1963). Reverend G.A. Formeret was appointed to Dundas from 1882 to 1886, to be replaced by the Venerable Archdeacon E.A. Irving in 1886, who remained at St. James' until the end of the period studied (Gilman, 1963).

Thus, there were four main reverends who presided over the Dundas parish during this study. The Reverend Osler had the longest appointment at St. James' Church, lasting approximately 25 of the 39 years covered in this study. As Reverend Osler's tenure lasted for close to 65% of the period studied, we can infer that the majority of the records were homogeneous.

2. Stamford

By 1791 Scottish settlers had established the Stamford Presbyterian Church, the first Protestant church in Upper Canada (Petrie, 1977). This was followed shortly by a Methodist church in 1804 (Lundy's Lane Historical Society, 1967). It wasn't until 1825

that St. John's Anglican Church was established (Gilman, 1963). The Church of St. John's was ministered by the same rectors as was St. George's in Drummondville, and Holy Trinity in Chippawa, for most of the mid-to-late 1800's. The Reverend at this time was William Leeming, who had been sent from England with his wife Margaret, in order to form roots for the Anglican Church in Southern Ontario (Gilman, 1963). Reverend Leeming also held monthly services in Waterloo, Thorold and St. Catharines. Stamford and Drummondville continued with the same rectors until the Reverend Cannon George A. Bull retired in 1902, and St. John's and All Saint's (previously St. George's) were finally separated into two parishes (Gilman, 1963).

3. Drummondville

The Anglican church in Drummondville was built in 1836 as a result of a disagreement between Reverend Leeming and his assistant Reverend F.W. Miller. Miller, angry with the established Anglican church, built a new chapel on Main St. in Drummondville, thus drawing parishioners from other churches in the area. This church was St. George's, and when Reverend Miller died in 1847, he deeded it to Reverend Leeming who ministered there until St. George's Church was taken down in 1856 and the present All Saint's church in Drummondville was built to replace it (Gilman, 1963). The Reverend Charles Lychester Ingles was ordained in 1848, and assisted Reverend Leeming, replacing him shortly before his death in 1863 (Gilman, 1963). Ingles became the rector of All Saint's and Saint John's of Stamford. A third church, Holy Trinity at Chippawa,

which had previously been a part of Reverend Leeming's charges, became a separate parish at this time. Reverend Ingles died in 1885 and was replaced that same year by Reverend Cannon George A. Bull, the son of Reverend George B. Bull, who was the rector until the end of the study period.

Therefore, three main reverends presided at the St. George's and All Saint's churches during the study period. Of the 39 years studied, 22 of these were presided over by the Reverend Ingles. Thus, 56% of the records were recorded by one clergyman, suggesting homogeneity in the over half of the records.

Conclusion

The life of a settler was most likely a hard one. Land had to be claimed and cleared, crops had to be planted and harvested by hand, for the most part, and access to medical treatment would have been rare for those establishing new townships. After the initial settlement of UEL refugees, the increase in trade and transportation in this district served to maintain the constant influx of people to the region (Lundy's Lane Historical Society, 1967). While promoting growth in industry, these new settlers were often responsible for the introduction of many diseases to the settlements, and the spread of illness between them (Woodhouse, 1967) (see Appendix 1 for summary of major historical events for this time period).

All of these communities were established at approximately the same time and shared many of the same experiences for the period studied. The remainder of this thesis

will explore how infant mortality rates in mid-19th century Southern Ontario might be seen as a reflection of the hardships faced by settlers in the Niagara district.

Chapter 3

Materials

This chapter discusses the types and sources of data used in this study. As well, the parish records for All Saint's Church in Niagara Falls, and St. James' Church in Dundas, are described and evaluated for consistency and quality. The final section of this chapter discusses the attempt at family reconstitution for both the All Saint's and St. James' Churches.

All of the information, for both of the parishes in this study, was personally collected in 1996-1997 from parish records which had been microfilmed and stored in the Anglican diocese records. The records of this diocese are located in the archives in Mills Memorial Library at McMaster University in Hamilton, Ontario. These data were collected and transcribed to an Excel data base. They were then transferred to several Quattro Pro spreadsheet databases and separated by the type of vital statistic, ie., burial or baptism record, as well as by parish. Research in the Mills Memorial Library was also conducted on government census documents and historical accounts concerning the histories of both Niagara Falls and early Dundas.

In association with this data entry and historical research, I made four consecutive trips during the months of October and November, 1996, to Lundy's Lane Historical Museum in Niagara Falls, Ontario. During the first visit to Lundy's Lane Museum I met with Ms. Donna Campbell, a member of the Ontario Genealogical Society, who had prepared full family reconstitutions for the All Saint's parish. These reconstitutions were

developed from information taken from parish records and available census data. From this work, and through various conversations with Ms. Campbell and others working in the museum, I was able to gain valuable insights into the history of mid-19th century Southern Ontario.

The All Saint's Anglican Church and the St. James Anglican Church shared similar historical backgrounds, so too did they share similar record keeping histories. The All Saint's Anglican Church records, which include the partial records of St. George's in Drummondville and St. John's in Stamford, include vital events occurring within the parish from 1836 up to the present day. Similarly, St. James clergymen recorded data in the parish from 1838 until 1966, although the church was taken down and rebuilt in a different location after the Second World War.

Both of these sets of data have serious gaps in earlier and later years, such as the ten year gap in the All Saint's burial record from 1889 to 1899. As a result of this, the period of 1850 to 1889 was chosen for analysis, as these years appeared to have the most continuous recordings of births and deaths available for both sets of records. Although it has been shown by Eversley (1966) that it is best to use samples where there is the greatest continuity and homogeneity of data, and not simply the longest runs available, this proved to be somewhat problematic for both of these parishes as clergy changes were not uncommon, consistency in information recorded was not maintained, and there were several competing congregations in each town throughout the time period studied.

Although the standard forms used for recording data were the same between the churches, often the amount or type of data recorded varied with each clergyman. The diligence of the data recording varied within each rector's term in office due to events such as illness, absence from the community, and a possible lack of diligence by the parishioners in reporting these events. All of these circumstances would result in differences in recording accuracy between the various rectors.

In order to assess the credibility of any study using parish records as a source of data, it is necessary to determine the quality of the parish records themselves. Thus, it is necessary to determine if any under-registration has occurred as this could skew any rates and means determined. Under-reporting could be caused by events such as: a haphazard use of the parish for recording events (ie. some children in family baptized, others are not) (Moffat, 1992), individuals moving from a community before events can be recorded, or a constant failure to report them to the clergy.

Other common causes of under-registration have been noted, amongst which are: competing denominations causing a divide in the parish itself (Drake, 1974), an inability to reach the parish to register events due to transportation or climatic problems, the infants' death prior to baptism (Wrigley, 1977), the migration of families between vital events, the use of different parishes for registering events (Levine, 1976), a disruption in recording due to changes in the presiding clergymen and, as mentioned previously, a lack of diligence in the individual responsible for recording events (Drake, 1974).

A frequent problem which occurred in early churches was the absence of the clergyman. This was often a regular or seasonal absence by the reverend in order to serve parishioners who lived in distant communities. This would have occurred due to a lack of local churches, causing the clergymen to serve a number of communities in the surrounding areas. For instance, for many years the clergymen in Dundas also had to serve surrounding townships of Ancaster, Flamborough, Hamilton and some parts of Niagara. During these absences it is quite possible that events were not recorded or were delayed until the return of the main clergyman.

A protocol developed by Drake (1974) was used in order to determine the extent of under-reporting of vital events in the parish records. This allows a critical evaluation of the reporting of events in communities, and helps to determine what was actually registered. In order to establish parish record quality in this study according to Drake's protocol, one must determine if there is a mean of at least 100 entries per year in the register; establish if there are any long and obvious gaps in the registered information; locate any competing denominations and determine the extent of the communities being recorded; evaluate the reliability of the rector in recording the vital events; determine the extent of the community which is being recorded; and finally, assess the quality of the information recorded for each individual (Drake, 1974).

3.1. Establishing the Mean Number of Entries per Year

The maximum number of entries recorded per year for All Saint's Church during the study period is 71, as seen in Figure 1. This number is substantially lower than the 103 maximum entries recorded per year for St. James Anglican church over the same study period , as noted in Figure 2 (summary of the numbers of baptisms, burials and marriages provided in Appendices 2 and 3).

The average number of entries per year between 1850 and 1889 is 42.1 for All Saint's Anglican Church, far below the 100 entries per year recommended by Drake (1974). Although St. James has substantially more entries, with an average of 61.5 for the study period, this too falls below the lower limit suggested by Drake. The number of 100 was suggested by Drake as a lower limit as it becomes difficult with smaller numbers to determine whether the lower count is due to under-reporting or scarcity of events occurring within the community. We know that the populations of both Dundas and Niagara Falls were quite small during this time period. For the mid-point of this study, the Township of Stamford had a population of 2990 people, and Dundas had a population of 3133 (Census, 1871).

Eversley (1966) suggests that only when there are less than 20 registered events per year should the records not be used. As the small number of events seen in both parishes are likely accurate reflections of the small populations of these towns for the period studied, Eversley cannot be dismissed, and thus the records may still be used for the purposes of this study.

Figure 1

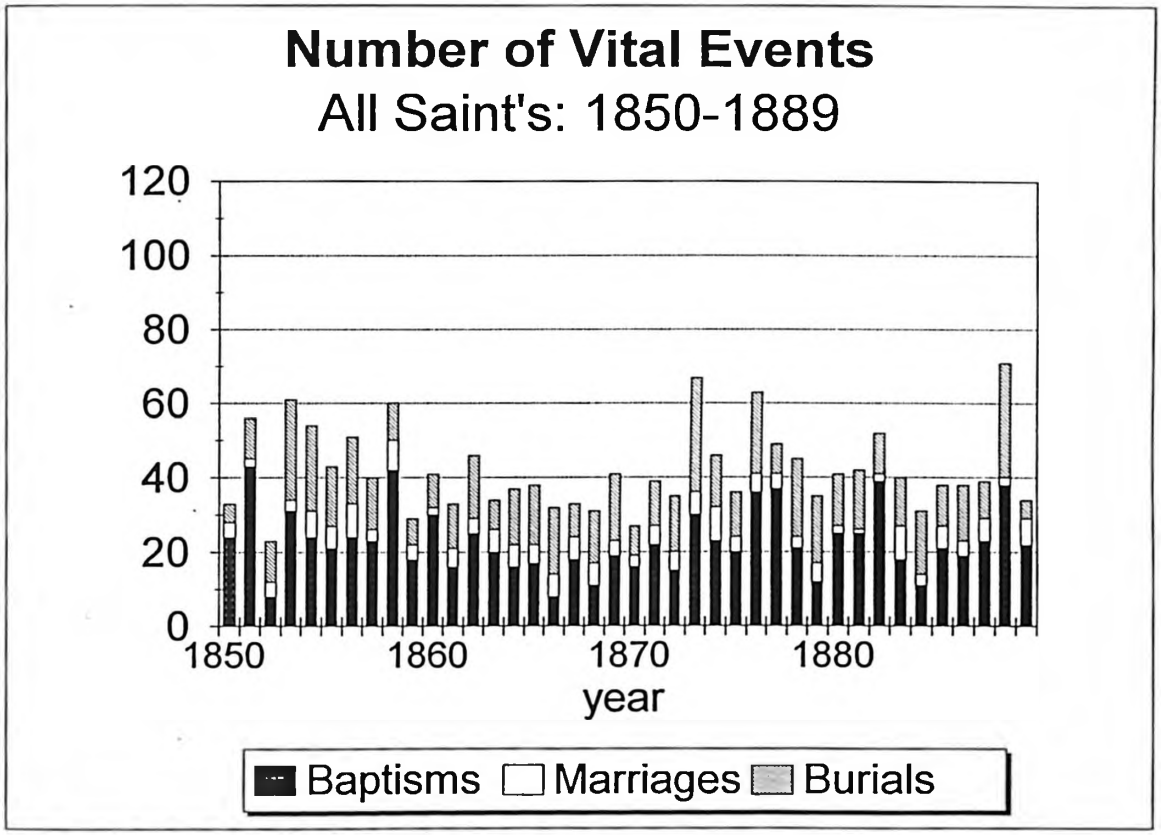
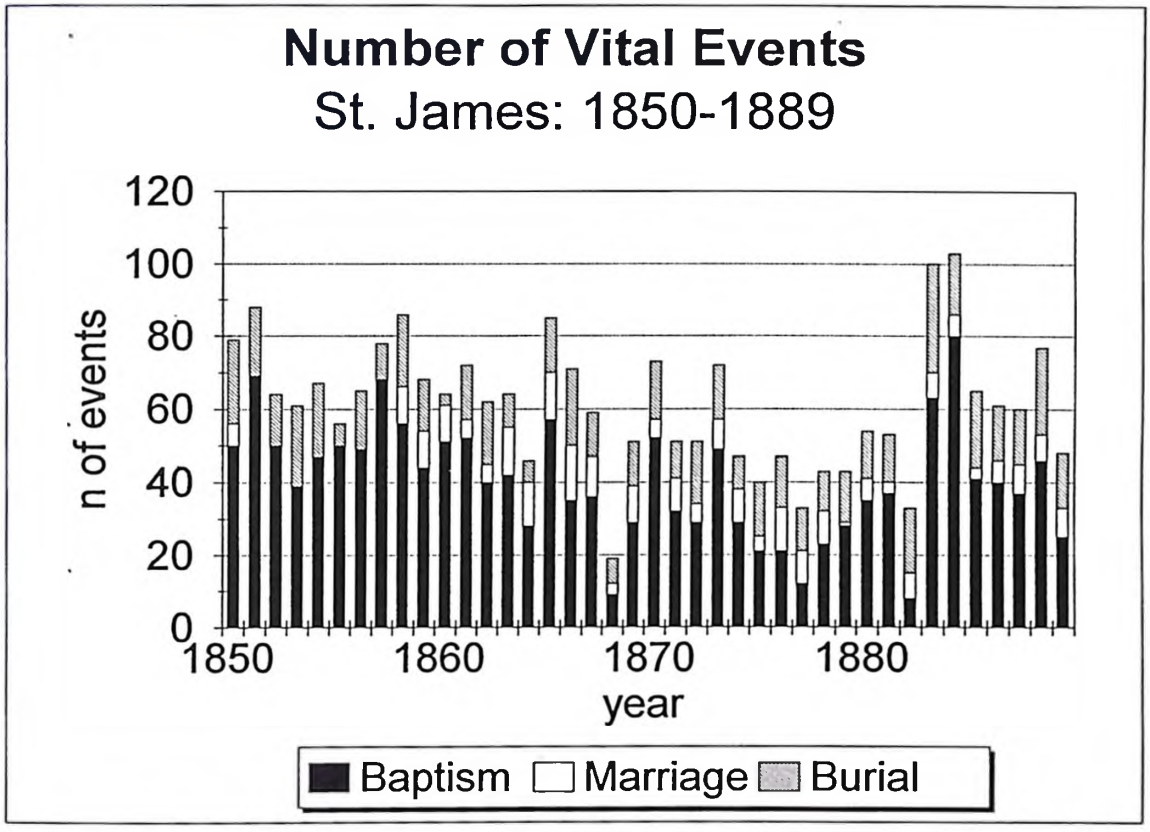

Number of Vital Events
All Saint's: 1850-1889
120
100
80
60
40
20
0
1850
1860
1870
1880
year
Baptisms
Marriages
Burials

Figure 2


Number of Vital Events
St. James: 1850-1889
120
100
80
60
40
20
0
n of events
1850
1860
1870
1880
year
Baptism
Marriage
Burial

3.2. Scrutinizing the Entries of Both Parishes for Overly Long Gaps

It is recommended by Drake (1974) that gaps longer than two or three months should not occur in the register for more than 10% of the total time studied. In accordance with this protocol, I examined both baptism and burial records for gaps that extended over 10% of the recording period. The registers for All Saint's Anglican Church and St. James Anglican Church were scrutinized for any gaps over 4 months as this would represent 10% of the 39 years studied. Due to the small number of marriages within these parishes, as well as the ten year gap in the marriage records for the St. James' Church, the marriage records for both parishes were not included in this analysis.

For All Saint's there were a surprising number of gaps occurring in both the baptism and burial records. The baptismal records show five instances where gaps of four or more months appear. Fewer gaps appear in the burial records, where there are four instances where burials were not recorded for four or more months (see Table 1).

Table 1.

Gaps of Four or More Months in All Saint's Parish Records
1850-1889

	From	To	Duration
Baptisms	February 2, 1852	July 16, 1852	5 months, 14 days
	December 28, 1873	May 14, 1874	5 months, 17 days
	November 19, 1882	March 11, 1883	4 months, 22 days
	November 9, 1883	April 8, 1884	4 months, 29
	October 31, 1885	March 7, 1886	5 months, 7 days
Burials	March 7, 1852	August 25, 1852	5 months, 18 days
	April 8, 1957	September 28, 1857	5 months, 20 days
	March 23, 1870	September 1, 1870	5 months, 8 days
	December 6, 1880	April 7, 1881	4 months, 1 day

As the gap which appears in the data for 1852 is the only one to overlap in the burial and baptismal records, it is likely that this represents a period of under-registration. Thus, there are 8 years out of 39 where over-long gaps in the parish records occur which may not be associated with under-registration and, instead, represent lulls in the occurrence of vital events as a result of a small population. Together, these nine years constitute 23% of the sample period, which is well over the ideal of 10% presented by Drake (1974). It is possible that many of the vital events could have been performed at another local Anglican church , for example the Trinity Church in Chippawa, as the reverends who presided over All Saint's and St. George's also were responsible for the recording of many events at this parish. It is not unlikely that people would travel to

another local Anglican church for services when their minister was absent or presiding over another parish.

The number and placement of gaps appearing in the St. James records differs substantially from those found in the All Saint's records. Only one baptismal record had a gap which was four or more months long. The greatest difference can be seen in the burial records, where there are 11 gaps which are longer than four months (Table 2).

Table 2.

Gaps of Four or More Months in St. James' Parish Records
1850-1889

	From	To	Duration
Baptisms	January 1, 1881	May 15, 1881	4 months, 14 days
Burials	October 18, 1854	March 3, 1855	4 months, 15 days
	September 11, 1856	May 12, 1857	8 months, 1 day
	November 4, 1859	April 7, 1860	5 months, 3 days
	April 30, 1860	November 18, 1860	6 months, 19 days
	July 2, 1863	January 23, 1864	6 months, 21 days
	May 7, 1864	November 26, 1864	6 months, 19 days
	June 6, 1867	November 6, 1867	5 months
	March 7, 1868	August 5, 1868	4 months, 29 days
	September 28, 1868	March 31, 1869	6 months, 2 days
	August 23, 1874	January 31, 1875	5 months, 8 days
	November 21, 1877	May 1, 1878	5 months, 10 days

As there are no gaps between baptisms and burials which over-lap in time, this suggests these gaps were a result of a lack of "activity" within the community, a lull in occurrence of events, and are not a result of under-registration. As two of these gaps in records occur within the same year, this leaves us with 11 years where under-reporting may have occurred. This represents 28% of the years studied, and once again far exceeds the 10% limit suggested by Drake (1974).

If the gaps are due to under-registration, this could be due to many factors, such as the absence of the reverend due to visits to neighbouring parishes. It was well documented that the reverends at St. James also serviced the Flamborough, Ancaster and Hamilton regions, and it is not unlikely that gaps in the register occurred during these times. As well, ill health seems to have plagued several reverends at All Saints and St. James and this could easily contribute to the lack of recording in the parish records. For instance, Reverend Miller, predecessor to Reverend McMurray, had chronic health problems, and was unable to fully serve his parish. The result of this was that the size and devotion of Dundas's parish was rather small when Reverend McMurray was appointed (Gilman, 1963).

When recording the data from the St. James Church, it became apparent that pages of the records had gone missing. The burial records were in particular disarray, with many of the pages out of sequential order, and many of the page numbers were absent. It is quite likely that many of the records went missing when the original church was taken

down in 1926, after the First World War, due to the encroachment of manufacturing plants (Gilman, 1963).

Although the percentages of gaps appears to be the same when comparing Stamford and Dundas, the actual pattern of occurrence of gaps in the baptismal and burial records is quite different between the two towns. This difference is most likely due to the fact that some records for the All Saint's Church were recorded at the Trinity Church in Chippawa, and that the St. James records have gone missing over the years. Due to these reasons, it is doubtful that a valid comparison between the gaps occurring in both parish registers can be made.

3.3. Locating Any Competing Denominations and Determining the Extent of the Communities Being Recorded

Due to the number of competing congregations in both Niagara and Dundas, it is highly unlikely that the numbers recorded in the Anglican church records are reflective of the size of the populations being studied. Historical documents show that many who settled in the Niagara district were Anglican, although there were a considerable number of Roman Catholics, Presbyterians and Methodists, as can be seen in Table 3.

Table 3

Population of Stamford and Dundas by Religion (Census of Canada, 1871)

Religion[1]	Population in Stamford	% of Population	Population in Dundas	% of Population
Baptist	84	2.8	151	4.8
Catholic	386	12.9	1061	33.9
Christian	13	0.4		0. 0
Church of England (Anglican)	633	21.1	701	22.4
Methodist	729	24.4	466	14.9
Brethren		0.0	36	1.1
Congregational		0.0	12	0.4
Lutheran	11	0.4	14	4.5
Presbyterian	469	15.7	642	20.5
Protestant	3	0.1		0.0
Universalist	3	0.1	1	0.0
Quaker		0.0	8	0.3
Other	9	0.3	26	0.8
Unknown	650	21.7	15	0.5
Totals	2990	100	3133	100

[1] The term Baptist includes the Free Will, Christian and Tunker faiths, the term Brethren includes the Plymouth and United faiths, the Methodist religion includes the Wesleyan, Episcopal and New Connection faiths, and the term Presbyterian includes the Church of Scotland and the Church of Canada and the Lower Provinces.

Thus, it is obvious that many different faiths existed in both Stamford and Dundas. In Stamford only 78% of the population are recorded as having a particular faith, and the Anglican religion represents approximately 21% of the entire population. For Dundas,

approximately 99.5% of the people are recorded as having a religious faith, with the Anglican church representing 22% of the population.

As well as competing denominations within a community, there is also the possibility of adjoining parishes where individuals from one parish may have travelled in order to record information, ie. marrying outside the community (Drake, 1974). The family reconstitution information gathered from Ms. Donna Campbell included references to births, deaths and marriages performed by reverends at the Trinity Church in Chippawa, suggesting a possible way to expand the present sample. Unfortunately, the Trinity Church in Chippawa was not adequately recorded in the Anglican Diocese in the Mills Memorial Library at McMaster University, nor was it adequately recorded in the family reconstitutions provided for its inclusion in this study.

3.4. Assessing the Reliability of the Clergymen Recording Events

Due to the changes in ministers in all parishes studied, it was not possible to choose a registration period corresponding with one minister's tenure. In both parishes there are occasions when the names of other clergymen and various assistants appear in the records as having entered vital registration information. Thus, it is necessary to evaluate the quality of all of the ministers' recording capabilities during the chosen time period.

For the All Saint's Church there were 3 full-time rectors during the period of 1850-1889. Of these three, only the Reverends Ingles and Bull contributed significantly to the baptismal record keeping for the period, representing 83.5 % of the baptisms recorded.

The other 16.5 % was contributed by 16 different individuals, who averaged the recording of nine events each. For marriages, the Reverends Ingles and Bull contributed 92 % of the records combined. The other 8% were recorded by 7 different individuals, who averaged the recording of 3 events each.

Similarly, at St. James, where 4 full-time rectors recorded data over the same period of time, the combination of the reverends McMurray, Osler, Irving and Formeret contributed 88% of the baptismal records. The other 12% were recorded by 25 different individuals, each contributing an average of 9 records. For burials, the same four reverends contributed 78% of the records, with Reverend Osler contributing 42% of the total himself, and the other 16 reverends noted contributed an average of 7.3 records each.

Thus, the All Saint's church had fewer reverends recording more of the vital information, suggesting greater reliability than that which is found in the St. James' parish. This would also suggest that the All Saint's church would have a greater continuity and homogeneity of data as recommended by Eversley (1966).

3.5. Assessing the Quality of the Information of Individual Records

It is important to determine the completeness of the amount of information recorded within each record. It is also of vital importance to assess the amount of under-reporting, if any, that had occurred in the registers. The quality of record keeping can be determined by the presence or lack of ancillary information. The more information

contained within records, the more useful the record is for determining vital events, and is thus of higher quality.

Unfortunately, the quality of parish records fluctuates substantially between parishes and recorders during the time period studied. For instance, it was not until 1869 that any cause of death was specified in the St. James records. The recording of cause of death was quite sporadic, and it wasn't until 1879 that the records were maintained with any consistency. Unfortunately, the reliability of this information must also be taken into consideration as it is not known if doctors attributed the causes of death for the records, or if this was done by the reverends themselves. If the causes of death recorded were determined by the clergymen, this information would have limited value and would be dependent on the medical knowledge and experience of the reverends themselves.

In Dundas, although there were no hospitals, there are records of doctors having practices in the area (Woodhouse, 1965; Woodhouse, 1967). As well, there are notes made in both parish registers of doctors presiding at births and deaths. Thus, it is likely that these doctors contributed to the cause of death information. Unfortunately, due to the fact that many of these diseases were not well understood or categorized by modern biomedical standards, it is likely that some of these deaths could have been attributed to the wrong causes.

The following tables (Table 4, Table 5) show the type of information which each parish recorded. Due to the changes in the clergy in both parishes, many ministers did not record all of the ensuing data.

Table 4.

Recorded Vital Information for All Saints Anglican Church
1850-1889

All Saint's			
Event	**Marriage**	**Baptism**	**Burial**
Name	Both	Yes	Yes
Ages	No	No	Yes
Marital Status	Yes	N/A	N/A
Place of Residence	Yes	Yes	Yes
Place of Marriage	Yes	N/A	N/A
Place of Birth	No	Yes	N/A
Date of Birth	No	Yes	N/A
Date of Baptism	No	Yes	N/A
Date of Marriage	Yes	N/A	N/A
Date of Burial	N/A	N/A	Yes
Name of Parents	No	Yes	N/A
Witness/Sponsor	Yes	Yes	N/A
Occupation	No	Parents	N/A
Cause of Death	N/A	N/A	After 1873
Minister	Yes	Yes	Yes

Table 5

Recorded Vital Information for St. James Anglican Church
1850-1889

St. James			
Event	**Marriage**	**Baptism**	**Burial**
Name	Both	Yes	Yes
Ages	No	No	Yes
Marital Status	Yes	N/A	N/A
Place of Residence	Yes	Yes	Yes
Place of Marriage	Yes	N/A	N/A
Place of Birth	No	Yes	N/A
Date of Birth	No	Yes	N/A
Date of Baptism	No	Yes	N/A
Date of Marriage	Yes	N/A	N/A
Date of Burial	N/A	N/A	Yes
Name of Parents	No	Yes	N/A
Witness/Sponsor	Yes	Before 1857	N/A
Occupation	Occasionally Males	Occasionally Parents	N/A
Cause of Death	N/A	N/A	After 1879
Minister	Yes	Yes	Yes

The major problems in both sets of data result from changes in the clergy. For instance, it was not until after 1873 that All Saint's records included cause of death in burial records. This coincided with the recordings of a part-time assistant, Reverend Bartlett, who seems to have introduced this practice into the records. Similarly, the records at St. James only include cause of death after 1879. However, this is likely a reflection of a change in the data entry form to one which included this category.

Family Reconstitution

Family reconstitution is a process whereby individual's surnames are used to identify family units. Individuals are then linked in relation to one another, as well as to certain periods of time, through baptismal, marriage and burial records. This is done in order to reconstruct the family and the history of the individual family unit. Once the individual families have been separated, they are then grouped into marriage cohorts, consisting of the unions formed during the period of study (Wrigley, 1966).

One of the main drawbacks with this method, as compared with the aggregate data collection techniques, is that much of the data is discarded as it is often difficult to link individuals' vital events to specific families. Any information not linked to larger family units must be discarded and not used in the analysis. Another confounding factor with this type of analysis is that it is hard to link individuals to families due to high migration rates, as well as high levels of under-registration. As well, changes occurring over a short time period cannot be observed, instead, extended time periods are needed in order to reconstitute even a small percentage of the families (Wrigley, 1966).

Although this method has many drawbacks, it can also be a useful tool in understanding events in a community, as well as the effects these events may have had on specific families. When using family reconstitution methodology, the family becomes the population at risk, instead of inaccurate estimates of population size in pre-census accounts. This gives fluidity to the history of the area as members of the reconstituted families are known to have remained in the community as the family is traced over an

extended period of time (Norton, 1980: 19). This method is important for the present study as it allows us to look at, and ask questions concerning the effects that family structure may have had on infant mortality in the communities studied. Many aspects of family structure can be analyzed (Moffat, 1992).

Due to the fact that St. James' Anglican Church is missing ten years of marriage records (Appendix 3), from 1850 to 1858, a marriage reconstitution was not attempted due to possible biases in the information recorded, as well as the possible loss of records when the church was relocated.

As previously mentioned, Ms. Donna Murray, a genealogist from the Ontario Genealogical Society, had performed the family reconstitutions for the churches in Niagara Falls. The family work sheet form which she used classifies each family according to the surname of the groom. Ms. Murray recorded information, when available, such as: bride and groom's name, the name of their children, their date and place of birth, the date and place of their christening/baptisms, the date and place of their deaths, the date and place of the burials, the names of their father's and mother's, as well as their mother's maiden name (Appendix 4).

Unfortunately, when separating my sample from the reconstituted families formed by Ms. Murray, I found that the records for the All Saint's church were problematic in that many of the dates of vital events were missing. Close to 60% of the families formed between 1850-1889 were missing both the husband's and wife's death record. In addition, I could only separate 15 families formed by marriages in the study period due to absence

of marriage records. Large gaps in the available data were discovered when attempting to record the age of a woman at marriage and at the birth of her first child, as can be seen in the data sample provided in Appendix 5. Thus, no family reconstitution analysis of the All Saint's parish records could be performed with any certainty.

Although family reconstitution is considered to be one of the most effective methods of analysis for historical studies, it is also very difficult to find samples which are amenable to this sort of study. This type of study is further confounded when faced with a small population with several different religions and high migration rates. Family reconstitutions based on vital events are only representative of a population if the people within the town make themselves known to the registers. If this does not occur, there will be many individuals who are missed in the study (Norton, 1980).

The fact that a reconstitution could not be performed for the All Saint's parish is not very surprising. It was already known that the size of the congregation was relatively small, with several competing denominations in the surrounding region. Qualitative analysis of the parish data has also suggested that migration was common throughout the region, as seen in the numbers of unlinked burials.

Conclusions

Through these tests the records for both St. James and the All Saint's parishes fall short of the criteria set forth by Drake (1974). Neither of the parishes met the average number of 100 entries as suggested by Drake (1974), although both exceeded the 20 events per year suggested by Eversley (1966). As these small numbers of vital events are

most likely representative of the small populations of both parishes, the records were further tested for their usefulness to this study.

Whereas the gaps in the burial and baptism records are equally distributed in the All Saint's records, this does not appear to be the case for the St. James' records where the gaps in the burial records outnumber those in the baptismal records eleven to one. Although both parishes have gaps in their records exceeding the recommended 10%, this appears to be a greater problem in the St. James' Church records as the vast majority of the gaps reside in the burial records. This suggests that while small sample sizes and some under-reporting may have occurred in the All Saint's parish, these problems were exacerbated in the St. James' Church's data. From the analysis of gaps in data, the burial and marriage records for the St. James' Church appear to be the most seriously biased data sets in this study. As the gaps appear to seriously affect the burial records at the St. James' Church instead of being divided equally amongst the burial and baptismal records, it is possible this could be the result of missing records.

While it is evident that there were numerous different religions present in both Stamford and Dundas, it can clearly be seen that the Anglican faith was important to both regions. Although there is evidence that vital events from the All Saint's parish may have been recorded in the Trinity Church in Chippawa, their absence from the Anglican Diocese in Mills Memorial Library in McMaster University, and their brief mention in Mrs. Donna Murrays' reconstitutions prevented their inclusion in this study.

All Saint's Church benefited from having a greater consistency in record keepers than St. James Church, where more full and part-time record keepers contributing to the information gathered. This, in itself, suggests that the quality of data would suffer due to the lack of continuity and homogeneity in record keeping during the study period. Evidence of this can be seen in the quality of information on individual records. Both the All Saint's Church and St. James' Church records reflect changes occurring within the record keeping practice which coincide with changes to the clergy. It is likely that each reverend differed in opinion as to what information he thought was important for recording.

Through this analysis it can be seen that problems with gaps in the records, lack of recorded information, missing years and small sample sizes precluded family reconstitution in both parishes. As well, the quality of the St. James' data was found to be inadequate for determining infant mortality within the Dundas community. With this in mind, analysis of the St. James' Church's data will proceed, along with the analysis of the All Saint's church's data, in order to illustrate potential problems which may occur when working with an inadequate data set.

Chapter 4

Methods

Both qualitative and quantitative methods were used in the analysis of the information in this study. The qualitative work for this project, which consisted mainly of archival research on records from the All Saint's and St. James' churches, as well as field work conducted during trips to Lundy's Lane Historical Museum in Niagara Falls, Ontario, has been previously discussed in Chapter 3. Thus, this chapter will focus solely on the quantitative methods employed in this study. Aggregate analysis formed the basis of the quantitative analysis, focusing on the community as the unit of study. This method allowed a detailed analysis of the communities and gave insight as to how historical events might have affected both communities and individuals in mid-nineteenth century Southern Ontario

Quantitative Methods

Aggregate data analysis consists of looking at the entire community as the unit of study. As a large portion of the information studied was recorded prior to the commencement of the civil census, it is difficult to determine the exact population at risk in both regions for the complete time period. Thus, we are limited to analysing fluctuations occurring within burial, baptismal and marriage data recorded in each parish. From these parish records, information concerning family structure and patterns of migration can often be discerned. As well, fluctuations in these vital events may be

valuable sources of information as they often coincide with events such as droughts, epidemics, and overly harsh winters or summers.

Aggregate data analysis is also very important for this type of research as less information is wasted than with qualitative methods. Aggregate analysis can also be very important for analysis of populations which are highly mobile. The movement of individuals within and between towns increases the difficulty of linking individuals and important vital events to any one family group (Eversley, 1966: 45). This would be particularly appropriate for the parishes in Stamford in the mid-19th century due to the substantial movements of individuals to and from the United States (see Appendix 1), as well as the large migrations of individuals between neighbouring communities within Southern Ontario.

As the number of baptisms are recorded for a prescribed period of time (year, decade), the IMR (Infant Mortality Rate) can be a useful tool for aggregate analysis as the defined group of baptisms can be treated as the population at risk (Wrigley, 1977; Wrigley, 1966; Trapp et al., 1983).

The formula for calculating the IMR/1000 used is modified as follows:

$$\text{IMR} = \frac{\text{n of infant burials}}{\text{n of live baptisms}} \times 1000$$

For the purposes of this study, only those children who are less than 365 days at the time of their death are considered to be infants.

In the case of the IMR formula, the data sets used in calculating the numerator and those used for the denominator consist of different groups of individuals. When

calculating the IMR using baptism data for a specific time period, it is important to ensure that the infants who have died after the end of the prescribed time period, as well as those who are born prior to the time in question, are not counted in either the numerator or denominator (Eversley, 1966). The inclusion of these infants could distort the IMR substantially.

One of the main issues with this type of analysis is to make certain that neither of the sets of data are underrepresented, as this would cause the IMR to become distorted. Thus, it is very important to determine if any inconsistencies exist in the reporting of the data. In order to determine this, several tests can be used as described by Wrigley (1977) and Jones (1976). These tests have been successfully used by Wrigley (1977) and others while working on Anglican Church parish records in England.

As these methods have proven to be useful in detecting potential inconsistencies, they were applied to the data from the All Saint's and St. James' parishes in order to determine if any under reporting of data has occurred to skew the data.

It was necessary to cross reference baptismal and burial records in order to assess the reliability of the information in the records, ie. date of birth, age etc. The linking of records allows for the creation of a more complete database. This is accomplished by adding in from one record missing information from the other, and, importantly, to determine age at death in days by subtracting dates of death from birth dates. Only those less than 365 days at time of death are considered infants for this study. There were 56 cases (56%) where birth dates were available for the All Saint's records, and 65 cases

(76%) for the St. James' parish. Age at death was provided for all individuals in the death records of both parishes.

Although it is difficult to determine the number of individuals buried outside of the parishes studied, it is highly likely that there were individuals buried in different communities from where they were born. This is a result of many of the same factors which affect the recording of baptisms, such as individuals travelling to other communities and the migration of individuals and families from their place of birth.

Baptisms were often performed in nearby communities which were considered to be a part of the reverend's parish; for instance, Ancaster and Flamborough were considered part of the St. James' parish. As well, there are those baptisms, such as the ones occurring in the United States, which clearly fall outside of the range of the parishes and communities studied.

As neither Stamford or Dundas is a closed system, it is likely that under-registration of vital events occurred due to the mobility of the parishioners. Thus, the records of events such as marriages, baptisms and burials would not only include many individuals from outside areas, but would also likely be missing many of the records of events occurring to individuals in the parishes under study.

The estimation of the IMR is confounded by this movement of individuals within and between communities, resulting in only segments of the population having vital events registered. As the inclusion of infants baptized within the community, but buried away from the community, would underestimate the IMR, and inclusion of burials of infants

baptized in other parishes over-estimates the IMR, it is assumed that movement in both directions was equal and cancel each other out (Moffat, 1992). Thus, the numbers of baptisms and burials within the communities studied will be assumed to be a true representation of the events occurring within the communities.

Another potential cause of underestimation of birth rates is the exclusion of the deaths of infants who died before they were baptized. It is possible to test whether this is a serious concern by measuring the delay which occurs between the date of birth and the date of baptism (Wrigley, 1977). The mean number of days between the date of birth and baptism was determined for four different cohorts from 1850 to 1889. As the mean delay in days between births and baptisms was found to differ significantly when outliers (any delay in baptism longer than 400 days) were included in the sample (for All Saint's X^2=18.05, d.f.=3, p=0.0042 and for St. James' X^2=43.83, d.f.=3, p=0.00), outliers were removed in order to prevent any of the means from being skewed upwards.

Table 6

Mean Number of Days Between Date of Birth and Date of Baptism
St. James Anglican Church and All Saint's Anglican Church: 1850-1889

All Saint's	cohort	mean delay in days (including outliers)	mean delay in days (excluding outliers)	range	outliers (400+ days) as a % of total baptisms
	1850-59	1,117.33	116.18	0-390	8.9
	1860-69	1,957.12	135.38	0-400	7.2
	1870-79	1,763.12	114.49	0-387	9.8
	1880-89	1,921.13	120.42	0-390	9.5
St. James	1850-59	1,009.53	125.81	0-395	9.9
	1860-69	1,747.96	111.18	0-386	10.0
	1870-79	837.33	103.58	0-400	5.9
	1880-89	1,423.36	93.57	0-385	11.0

Table 6 shows that the mean delay in days, for all decades shown, is greater than three months for both churches. It is also noticeable from the number of delays of 400+ days that a large number of individuals were baptized after the age of one in both parishes. The long delay occurring between births and baptisms is consistent for both churches, showing that neither parish baptized their infants immediately following birth. However, the delay for the St. James' church appears to decrease over time from 125.8 days in 1850-89 to 93.6 days in 1880-89. This is possibly due to problems with the St. James' Church data, and more likely a reflection of under-registration than of a real decrease in delay between birth and baptisms being performed in the community. This is supported by the large percentage of outliers between 1880-89, which suggest that more

infants were being baptized after they were one year old, and not earlier than 93.6 days as the lower mean delay in days between birth and baptism would suggest. Due to the long delays noted for both parishes, it is quite likely that many births occurred which could have been missed due to the infant's death prior to baptism.

However, another factor which needs to be considered is that sickly infants may have been baptised earlier than healthy children due to their greater likelihood of dying. Often, these resulted in private baptisms in the home. By looking at the numbers of private baptisms in the registers we can obtain insight into the number infants who were baptized due to possible ill health, and thus not lost to observation due to the long delays which may occurred between birth and baptism.

Table 7

Private Baptisms

	cohort	n of private	total baptisms	percent
All Saint's	1850-69	7	427	1.6
	1870-89	47	406	11.5
St. James	1850-69	89	901	9.8
	1870-89	26	636	4.0

As shown in Table 7, few private baptisms occurred for the majority of the years in the study, suggesting that if private baptisms represent sickly infants, they would only compose a small proportion of the population studied. A chi square analysis was performed on both churches to see if there was any significant changes in the number of

private baptisms between the two cohorts. For the All Saint's parish, the results were significant at $X^2 = 33.90$, $p = 0.00$, d.f=1, suggesting that a significant increase in private baptisms did occur between the two cohorts. For St. James', the decrease in private baptisms was significant between the two cohorts ($X^2 = 18.05$, $p=0.0000215$, d.f.=1).

It is important to note that the recording of such information was sporadic, and depended largely on the presiding reverend. For instance, although the numbers of private baptisms appears to be rather high for the 1850-69 cohort in the St. James' parish, it is important to note that the most complete records kept during the study were those of Reverend McMurray who presided over the parish in the 1850's. Thus, the records may not accurately reflect the number of private baptisms occurring, and instead represent the care of the record keeper.

It is possible that sickly infants were not all baptized privately, but were still being baptized earlier due to their greater risk of dying. If this is so, then the mortality sample would have a shorter lag time between birth and baptism, reflecting a smaller number of infants being lost to the records as they would have been registered prior to dying.

Table 8

Mean Number of Days Between Birth and Baptism for the Mortality Sample, All Saint's and St. James Anglican Churches: 1850-1889

	cohort	mean delay in days	range
All Saint's	1850-59	87.4	0-314
	1860-69	57.7	0-200
	1870-79	116.9	0-318
	1880-89	50.7	0-127
St. James	1850-59	80.0	0-329
	1860-69	92.6	0-175
	1870-79	74.8	0-330
	1880-89	91.3	0-329

A comparison of Tables 6 and 8, shows that this suggestion is supported by the evidence. For the All Saint's Church, the decades of 1870-79 are most similar to Table 6 in mean delay in days between birth and baptism. Similarly, the St. James' Church records show that the decade 1880-89 is most similar to Table 6 in mean delay in days between birth and baptism. This shows that sickly infants, who are at a greater risk of dying, are likely to be baptized earlier than other infants, and thus not missed from the sample.

Examinations of the lapse in time between births and baptisms shows us that almost 37% of the baptisms that occurred at All Saint's Church were of individuals one year or older. Similarly, over 38% of the baptisms at St. James Church were older than one year (Table 9). Not only does this further demonstrate that long delays exist between birth and baptism for both parishes, it also shows that using baptismal dates, if birth dates are not available, will not give accurate estimates of the infants' ages.

Table 9

Lapse in Days Between Births and Baptisms

n of days	n of baptisms All Saint's	percent of total baptisms	n of baptisms St. James'	percent of total baptisms
< = 365 (1 yr)	581	63.4%	1029	61.8%
>365, <= 730 (2 yrs)	81	8.8%	184	11.0%
>730, <= 1825 (5yrs)	99	10.8%	195	11.7%
>1825 (5+ yrs)	156	17.0%	258	15.5%
n >365	336	36.6%	637	38.0%

It is possible to assess this type of under-registration by linking the infant's baptism and burial records (Wrigley, 1977). For the study period at All Saint's, 100 infant burials were recorded, and of these 56 had corresponding baptism records, representing 56 % of the sample. St. James had 85 infant burials recorded, of which 65 had corresponding baptism records, representing 76 % of the sample. Table 10 shows the proportion of unlinked burials, for both churches, in each decade of the study.

Table 10

Unlinked Infant Burials for All Saint's and St. James' Anglican Churches: 1850-89

	Decade	N of infant deaths	n of unlinked burials	% of total burials
All Saint's	1850-1869	52	18	35%
	1870-1889	48	26	54%
St. James	1850-1869	38	11	29%
	1870-1889	48	9	19%

As can clearly be seen in Table 10, fluctuations in the number of unlinked burials occur at both sites. The increase in unlinked burials from All Saint's Curch from 35% in the 1850-69 cohort to 54% in the 1870-89 cohort approaches statistical significance ($X^2 = 3.12$, p=0.0773, d.f.=1). The differences between cohorts were also tested for St. James' Church, and were not significant ($X^2 = 0.73$, p= 0.3927, d.f.=1).

The increase in unlinked baptisms at All Saint's Church may be related to the mean delay in days between birth and baptism (Table 6) for the parish. If a large amount of time elapsed between births and baptisms for All Saint's parish, it is likely that many infants could have died prior to being baptized, and thus produce the greater number of unlinked burials. Alternatively, this may be the result of the migration of families from the All Saint's parish after an infants' baptism, and prior to its' death .

It may not necessarily be true that unlinked infants died too soon after birth for baptism to take place. In fact, as can be seen in Table 11, approximately 14 % of the unlinked infants at the All Saint's parish died in their first week of life, whereas 25% died in the first month after birth. Since approximately 74% of the All Saint's unlinked infants died after their first month of life, this would have left ample time for these infants to have been baptized, taking into consideration the long delay between birth and baptism for this parish.

Similarly, only 5% of the unlinked infant deaths at St. James parish took place in the first week of life, and 85% of the deaths took place after one month. This too would have left sufficient time for the infants to have been baptized prior to death. Thus,

evidence points to several possible conclusions. For instance, it is possible that these unlinked deaths corroborate the evidence of long delays between birth and baptism presented in Tables 6 and 8. Alternatively, it is also a possibility that these unlinked deaths are a result of families moving into the parish after the birth of their child, prior to baptism.

Table 11

Age Distribution of Unlinked Burials for the All Saint's and St. James' Anglican Churches 1850-1889

age at death (days)	n of unlinked deaths-All Saints	% of total unlinked burials	n of unlinked deaths-St. James'	% of total unlinked burials
0	2	5.0%	0	0
1-6	4	9.3%	1	5%
7-27	5	11.6%	2	10%
28-182	25	58.1%	9	45%
183-364	7	16.0%	8	40%
total	43	100.0%	20	100%

As under-registration of baptisms causes inflation of the IMR, this study will use "dummy births" in order to compensate for the biases this misrepresentation causes (Moffat 1992). For this compensation to occur, each unlinked burial will be matched with an added birth, the "dummy birth" for the calculation of the IMR. As Wrigley (1977) noted, it is more likely that births, and not deaths, are under-registered. This is a result of the fact that the majority of deaths occurring in a given community will be recorded, due to their social importance. Conversely, it is not unlikely that births would go unaccounted due to early infant deaths, and migration of families, for example. For the All

Saint's parish, 44 "dummy births" are added to the total number of births for the calculation of the IMR, and for St. James' 20 "dummy births" are added to the calculations.

Conclusions

From these tests we can see that serious under-representation was occurring at the St. James' parish, most likely due to missing records and gaps in the recorded data. The mean delay in days between births and baptisms, although appearing to decrease between 1850-59 and 1880-89, is most likely the result of under-representation of births. The number of outliers occurring during the 1880-89 cohort are the highest for the study period, with the second longest mean delay between births and baptisms when the outliers are included, suggesting an excess number of individuals were baptized out of infancy. However, it is likely that sick or dying infants may not have been missed from the parish registers, as the mean delay in days for the mortality sample were greatly reduced for both parishes.

The number of private baptisms decreases significantly from the 1850-69 cohort to the 1870-89 cohort for St, James' Church. This, as previously mentioned, is less likely a result of a decrease of private baptisms in the later cohort, and more likely the result of superior record keeping by Reverend McMurray when he presided over the parish in the 1850's. This is also reflected in the greater number of baptisms recorded for the earlier cohort in general.

Although the differences between linked and unlinked burials was not found to be significant for the St. James' Church's data, it approached significance for the All Saint's Church. The differences between linked and unlinked burials most likely result from the long delay between births and baptisms occurring during the study period. As well, the high rates of migration in Southern Ontario for this time, leading to families moving after the birth of their infant, but before its baptism, could also be responsible for the problems in linking data.

Chapter 5

Results

This chapter presents the results of aggregate quantification of infant mortality at both the All Saint's Church and the St. James' Church for the study period, 1850 to 1889. Results are presented for estimates of the infant mortality rates (IMR) for both of the parishes studied. As well, the causes and seasons of death for infants and adults are examined in order to determine whether there were any patterns of mortality occurring within the communities studied.

Infant Mortality Rates

As the baptisms in both communities are likely under-recorded, as previously discussed in Chapter 3, 44 "dummy births" were added to the All Saint's baptismal record total, creating a total number of 877 baptisms for the time period studied. As well, 20 "dummy" births were added to the St, James' baptisms, creating a total of 1557 baptisms for the time period under study. The number of baptisms used for both parishes is based only on the recorded baptisms of those born between 1850 and 1889.

The IMR's for both churches were derived from the corrected number of births and then compared to the IMR's prior to this adjustment. The comparison of the two IMR's is summarized in Table 12.

Table 12

Corrected Vs. Uncorrected IMR's per 1000 Live Births.

	year	infant burials	corrected births	IMR/ 1000	infant burials	uncorrected births	IMR/ 1000
All Saint's	1850-59	32	263	121.6	32	254	126.0
	1860-69	20	182	109.9	20	173	115.6
	1870-79	30	247	121.5	30	228	131.6
	1880-89	18	185	97.3	18	178	101.1
	Totals	100	877	114.0	100	833	120.0
St. James	1850-59	21	523	40.0	21	516	40.6
	1860-69	16	389	41.1	16	385	41.5
	1870-79	17	327	52.0	17	325	52.3
	1880-89	31	318	97.5	31	311	99.6
	Totals	85	1557	54.5	85	1537	55.3

Table 12 shows that there are minimal differences between the corrected vs. the uncorrected IMR's for both the All Saint's and the St. James' parishes. Using the totals, the infant mortality rates for the corrected and uncorrected IMR's within each parish were tested using a chi square test. No significant difference was found for either parish, where All Saint's had a $X^2 = 0.15$, 3 d.f., $p = 0.99$, and St. James had a $X^2 = 0.02$, 3 d.f., $p = 0.99$.

The IMR's of both parishes fluctuate minimally throughout the period studied, with IMR's for All Saint's ranging from 101.1/1000 to 131.6/1000. The IMR's for St. James

show a tremendous increase in the 1880 to 1889 cohort. For the remainder of the cohorts, the All Saint's IMR's are more than double those of the St. James' parish.

The IMR for the All Saint's parish is estimated at being between 114 and 120/1000, whereas the IMR for the St. James' parish is approximated as between 54.5 and 55.3/1000, as listed in Table 12. The IMR for the All Saint's parish is slightly less than expected values for mortality rates reported in pre-industrial populations, as well as for what would be expected for centers in Southern Ontario, and the United States in the mid-nineteenth century (Boatler, 1983: 13; Ball and Swedlund, n.d.; Sawchuk, Burke and Choong, n.d.).

As the IMR's for the St. James' Church are far from what would be expected in a Southern Ontario town in the mid nineteenth century, it is obvious that the data are biased, most likely as a result of the small sample sizes, under-registration in the baptism and burial registers, as well as missing records. There is a strong possibility that problems with the St. James' burial records could be causing the apparent fluctuations in IMR's over the decades, as well as the great differences in IMR's between the two parishes.

Another method of testing for under-registration is to check the IMR's for both parishes by sex (Table 13). The sex of an individual can be derived from the baptism and burial records, or potentially inferred from the names recorded.

Table 13

IMR's by Sex of Infant

sex[1]	cohort	All Saint's burials	All Saint's baptisms	All Saint's IMR/ 1000	All Saint's X^2	St. James' burials	St. James' baptisms	St. James' IMR /1000	St. James' X^2
M	1850-59	17	132	128.8	X^2=0.3	13	286	45.5	X^2=0.36
F	1850-59	13	122	106.5	p=0.58	8	229	34.9	p=0.55
M	1860-69	14	79	177.2	X^2=6.5	8	177	45.2	X^2=0.28
F	1860-69	5	93	53.8	p=0.01	7	205	34.1	p=0.59
M	1870-79	16	117	90.3	X^2=0.77	7	156	44.8	X^2=0.38
F	1870-79	11	111	99.0	p=0.38	10	166	60.2	p=0.54
M	1880-89	10	99	101.0	X^2=0.06	15	155	96.7	X^2=0.00
F	1880-89	7	78	89.7	p=0.8	16	163	98.1	p=0.97

[1] The sex of the infant could not be discerned in 7 of the All Saint's records and in 1 of the St. James records.

The sex ratio of those recorded in the baptism records is 105.7 for the All Saint's parish, and 101.6 for the St. James' parish. As the average sex ratio for human births is approximately 105 (Cavalli-Sforza and Bodmer, 1971), and is reported as such in other mid-to-late nineteenth century studies (Boatler, 1983: 13), it would seem that the All Saint's parish exhibits a normal female to male ratio, whereas St. James shows a slight under-representation of males at birth.

When breaking down these IMR's by sex, All Saint's shows a higher IMR for males as compared to females in all cohorts, except for 1870 to 1879 where this is a slightly

reversed. This change in IMR is likely a result of the small sample sizes as the decade of 1860 to 1869 shows remarkably high male IMR's, with 14 burials and only 79 baptisms recorded.

The breakdown of IMR's by sex for St. James' suggests that the male IMR's are higher for the first two cohorts, but then are surpassed by female IMR's for the last two decades. Chi square tests were applied in order to determine whether the differences between male and female mortality are significant. For the All Saint's parish the differences between the levels of male and female mortality are not significant for any cohort, except for 1860-69 (X^2=6.5, p=0.01), where males were more likely to die, or be recorded in the burial records, than females. The results are similar for the St. James' parish with results suggesting that there is almost equal likelihood of males and females dying and being recorded in the registers. The IMR's for both sexes are, for the most part, much higher for the All Saint's parish than for St. James.

As it is common for male infants to have a higher mortality rate when compared to female infants, it would be expected that this would be the case for both parishes if there are no problems with under-representation. This phenomenon is likely a result of the male infants' greater susceptibility to environmental stresses, and thus should be represented in all populations studied (Bourgeois-Pichat, 1951; Boatler, 1983). It is also possible that the higher IMR's for males could be a result of the under-reporting of female infant deaths. This is a possibility in populations where a male death is seen as more important to the family. The under-reporting of female infants is also more likely to occur when a family

lives further away from a parish. If a female child is valued less than a male, it is possible that less effort would be made to have her death reported. Thus, a lack of reporting of female infant deaths would lead to lower IMRs when compared to males.

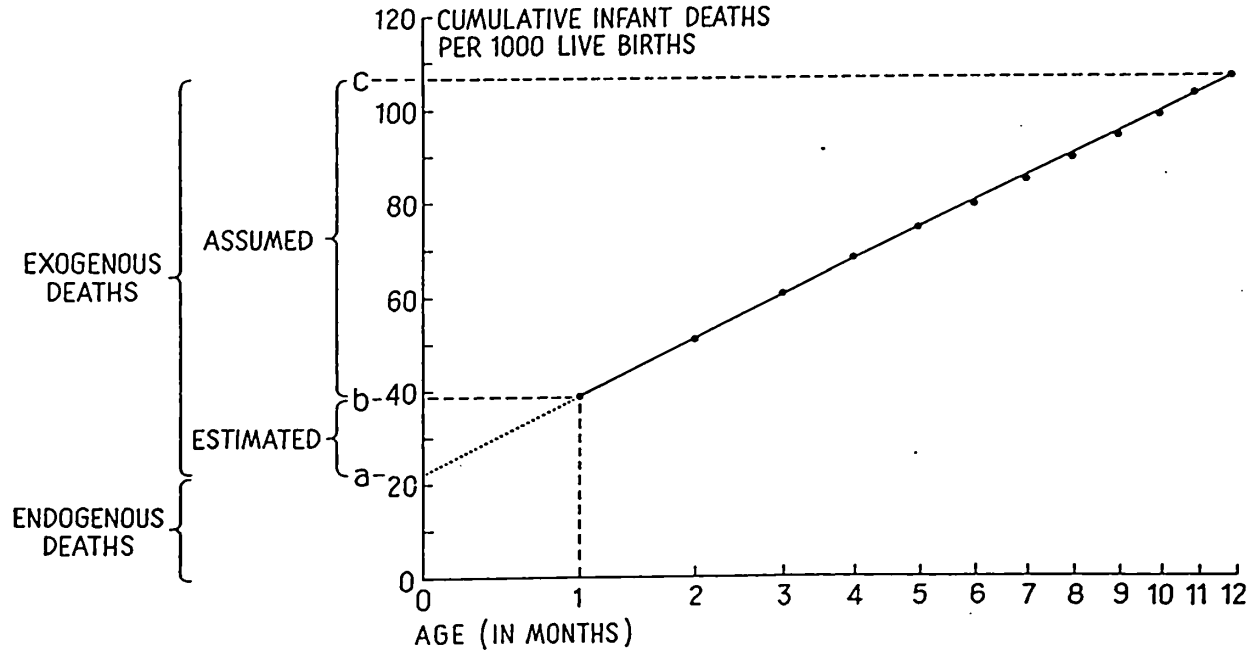
Biometric Analysis of the IMR

Infant deaths have been partitioned into two age groups, neonatal (birth to 27 days) and post-neonatal (28 days to <365 days), commonly associated with two different causes. Intrinsic causes are related to events preceding or relating to birth (trauma, genetic malformation etc.), and are referred to as endogenous deaths. Infant deaths influenced by the postnatal environment (poor nutrition, lack of sanitation etc.) are referred to as exogenous deaths (Knodel and Kintner, 1977). Endogenous mortality is assumed to occur mainly in the first month of life, while exogenous mortality is said to occur in the post-neonatal period. It is important to note that there are a certain number of exogenous and endogenous deaths which will occur in either period.

The biometric method was devised by Bourgeois-Pichat (1951) as a way of separating those deaths which occurred in the first month of life due to exogenous and endogenous causes. The biometric method is concerned with the fact that the accumulated post-neonatal infant deaths are usually linearly related with age, providing that age is expressed as the function $[\log(d+1)]^3$ (where d = age in days) (Bourgeois-Pichat, 1951). Thus, if the cumulative IMR is plotted on the y-axis against age expressed as the function $[\log(d+1)]^3$, a straight line will be formed if all deaths in the

first month are exogenous. It is then possible to calculate the endogenous mortality by extrapolating the line to intercept the y axis. By finding the difference between the estimated endogenous infant mortality and the total infant mortality in the first month, it is possible to calculate the exogenous mortality, as is demonstrated in section **ab** on the graph in Figure 3.

Figure 3



(Knodel and Kintner, 1977)

The formation of a straight line will only occur with the biometric method when exogenous infant mortality is equal to the total mortality after one month, line **bc** in

Figure 3 (Knodel and Kintner, 1977). This result cannot be said to hold true for all populations, as many deviations from this straight line can occur. When factors such as the method of infant feeding are taken into consideration, the slope of the line changes with increased mortality associated with the addition of supplementary foods. When infants are introduced to artificial feeding at an early stage in their development, the slope of cumulative mortality will be steeper than expected in the first six months of life. This increase in mortality is attributed to the introduction of new pathogens in unsanitary environments, as well as the loss of passive immunity which is conferred through breast milk (Coppa et al, 1993). If weaning does not take place until the second half of infancy, the slope of the line of cumulative infant mortality will rise more steeply than expected in the latter six months. If supplementary foods are not introduced at all before the end of the first year, the passive immunity and nutrients conferred by the breast milk will gradually deplete, resulting in stress and possible death if adequate supplementation is not introduced. This phenomenon is referred to as breast starvation (Jelliffe and Jelliffe, 1978).

In determining the ratio of the slope of the line of cumulative mortality from birth to six months, and again from six to twelve months, one can see whether or not a population was breast feeding its infants (Knodel and Kintner, 1977). This ratio of slopes is especially important if the difference in rates is not clearly visible to the eye when plotting the IMR using the biometric method. If the ratio determined is above one, this suggests that infant mortality increased at a greater rate in the later six months of infancy,

and was thus a breast-feeding population. If the ratio is less than one, the greatest portion of the mortality was occurring in the first six months of infancy and thus the population is considered to be non- breast-feeding (Knodel and Kintner, 1977). The impact that modes of feeding have on the biometric analysis is related to the advantages of breast-feeding over bottle-feeding and other forms of artificial feeding, such as spoon feeding. The advantages of particular modes of feeding are reflections of the infant's environment, sanitary conditions and access to medical care.

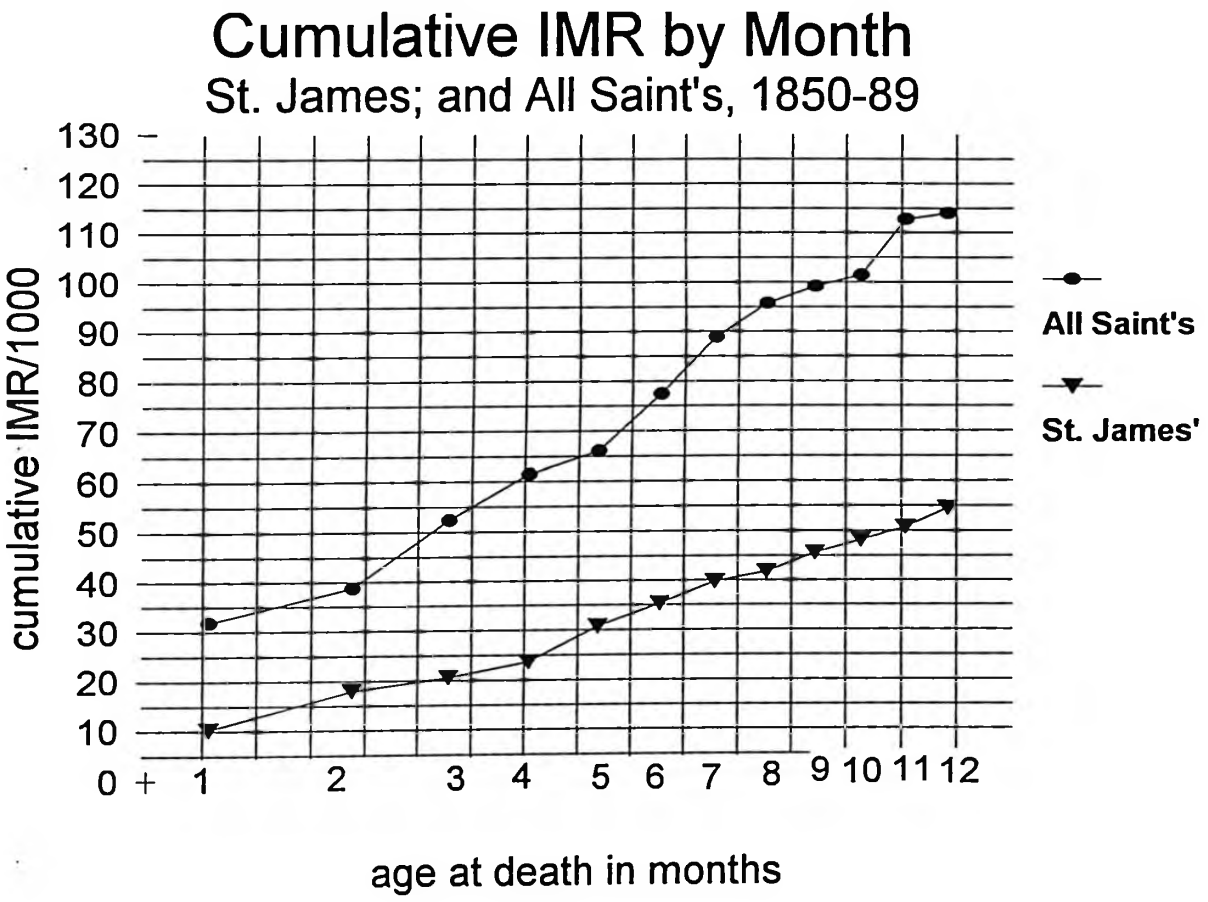
Application of the biometric model to the infant burial records for the Stamford and Dundas parishes are shown in Table 14, and plotted in Figure 4 for both the All Saint's and St. James Churches.

Table 14

Age-Specific Infant Deaths According to the Biometric Method.
All Saint's and St. James' Anglican Churches: 1850-1889

$[\log(d+1)]^3$	n of infant deaths at All Saint's	cumulative IMR/1000	n of infant deaths at St. James'	cumulative IMR/1000
0		13.9		2.0
313	28	31.9	16	10.3
576	6	38.8	12	17.9
757	12	52.5	4	20.6
908	8	61.6	5	23.8
1,039	4	66.1	11	30.8
1,154	10	77.5	7	35.3
1,259	10	88.9	7	39.8
1,355	6	95.8	3	41.7
1,443	3	99.2	6	45.6
1,528	2	101.5	4	48.2
1,607	10	112.9	4	50.7
1,685	1	114.0	6	54.6
total	100		85	

Figure 4


Cumulative IMR by Month
St. James; and All Saint's, 1850-89
cumulative IMR/1000
130
120
110
100
90
80
70
60
50
40
30
20
10
0
1
2
3
4
5
6
7
8
9
10
11
12
age at death in months
All Saint's
St. James'

As shown in Table 14, the endogenous mortality (the Y-intercept) for the All Saint's sample is 13.9 per 1000 live births, whereas the level of endogenous mortality is 2 per 1000 live births for the St. James' data. These numbers are extremely low, even by today's standards, potentially reflecting an under-recording of information in both of the parishes' records.

As can be seen in Figure 4, the slope of the line increases in the later six months for the All Saint's Church, suggesting an increase in mortality was occurring in the second half of infancy. The slope of the line for the St. James' Church increases gradually after five months. These observations are corroborated by the ratio of slopes for both parishes (Table 15).

Table 15

Ratio of Slopes. All Saint's and St. James' Churches: 1850-89.

All Saint's Church	rise	run	(slope) rise/run
1 to 6 months	45.61003	841.67740	0.05419
7 to 12 months	25.08552	425.59960	0.05894
Ratio of slopes =	1.08770		
St. James' Church			
1 to 6 months	25.04817	841.667740	0.02976
7 to 12 months	14.77200	425.59960	0.03471
Ratio of slopes =	1.16629		

The All Saint's parish has a ratio of slopes of 1.08, and St. James' has a ratio of 1.17. From this, it would appear that excess mortality occurred after the first six months of life, and thus the infants in both communities were breastfed for at least the first half of infancy. In light of the bias found in the St. James' Church's' IMR's (Table 12), and the under-representation of males at birth (Table 13), it is likely that the cumulative IMR's calculated for the biometric method are also flawed as a result of under-representation and missing data. Thus, it would be difficult to state that St. James' parish was breast-feeding their infants with any certainty. The higher number in the St. James' parish is likely a result of the smaller sample size, and not a reflection of a greater number of women breast-feeding their children in comparison to the All Saint's sample.

An alternative approach for determining whether or not under-reporting is occurring is through analysis of neonatal vs. post-neonatal mortality. It has been claimed (Wrigley 1977: 285) that if close to half of the total infant mortality occurs within the first month after birth, there are problems with the samples. This would suggest that either endogenous mortality is being overstated, perhaps due to the inclusion of still-born infants (Wrigley, 1977), or that the exogenous mortality is being under-reported. As shown in Table 15, this does not hold true for either the All Saint's or the St. James' samples. In neither parish does half of the infant mortality occur within the neonatal period. In fact, for both parishes, the number of neonatal deaths ranges between 0% to 35% for each decade studied.

Table 16

Neonatal Vs. Post-neonatal Mortality

All Saint's	decade	neonatal deaths		post-neonatal deaths		total infant deaths
		n	%	n	%	
	1850-59	8	25	24	75	32
	1860-69	7	35	13	65	20
	1870-79	8	27	22	73	30
	1880-89	5	28	13	72	18
St. James	1850-59	6	29	15	71	21
	1860-69	0	0	16	100	16
	1870-79	4	24	13	76	17
	1880-89	6	19	25	81	31

These increases in mortality in the later months of infancy, as seen in Table 16, could also reflect the fact that women in both the All Saint's and St. James' parishes breast fed their children during the early stages of infancy, supporting the earlier hypothesis.

Causes of Death

In order to fully understand infant mortality in either of these communities, it is important to evaluate the recorded causes of death. This information is very sparse in both sets of records, and is often not recorded at all by presiding reverends. If there were no doctors available, the reverend may have recorded what was commonly thought to be the cause of death, with no real medical opinion solicited. As well, many diseases and

illnesses were not well understood, many were unidentified and some diseases may have been confused with others prior to modern biomedicine.

Unfortunately, cause of death information was missing for the majority of the records gathered for both parishes. For All Saint's, only 37 infants (37%) had a recorded cause of death, and all of these occurred after 1873 as prior to this there were no recordings of cause of death at all. Cause of death was noted sporadically in the St. James's records after 1869, becoming more consistently recorded after 1879 until the end of the study period. For St. James, only 21 infants (25%) had an associated cause of death in the records.

These causes of deaths were organized into three categories, those presumed to be infectious in nature (respiratory and water/food borne), those non-infectious (congenital), and those whose causes are unknown (Figure 5) (see Appendix 6 for classification scheme). For All Saint's, of deaths with known causes, 60% resulted from various food and waterborne diseases, 24% were caused by airborne illnesses, 8% were related to congenital causes, and 8% were the result of non-specific non-infectious disease. In total, 38% of these deaths were attributed to cholera infantum. These deaths reported as resulting from cholera infantum must not be assumed to be caused solely by the disease cholera. In fact, it is likely that the majority of these cases were not caused by cholera at all. It was quite common to confuse infants' deaths resulting from gastro-intestinal upset and diarrhoea to cholera and tuberculosis (Swedlund, 1990). As can be seen in Figure 6, there is no peak in mortality as a result of cholera infantum which would suggest an

epidemic, instead we are presented with deaths from cholera infantum which occurred uniformly from 1873 until the end of the study period (Figure 6). This would suggest that these deaths represent a more common occurrence than an epidemic, and most likely can be attributed to other gastro-intestinal upsets and digestive problems.

The infant deaths at St. James' Parish were the result of many of the same factors. During the period under study, of the deaths with known causes, 33% of the deaths were due to airborne infectious diseases, 19% were a result of food and waterborne illness, 24% were the result of congenital problems, and 24% were the result of non-specific factors (Figure 7). Unlike the All Saint's parish, there was no mention of cholera infantum as a cause of death for any of the infants or adults.

Figure 5

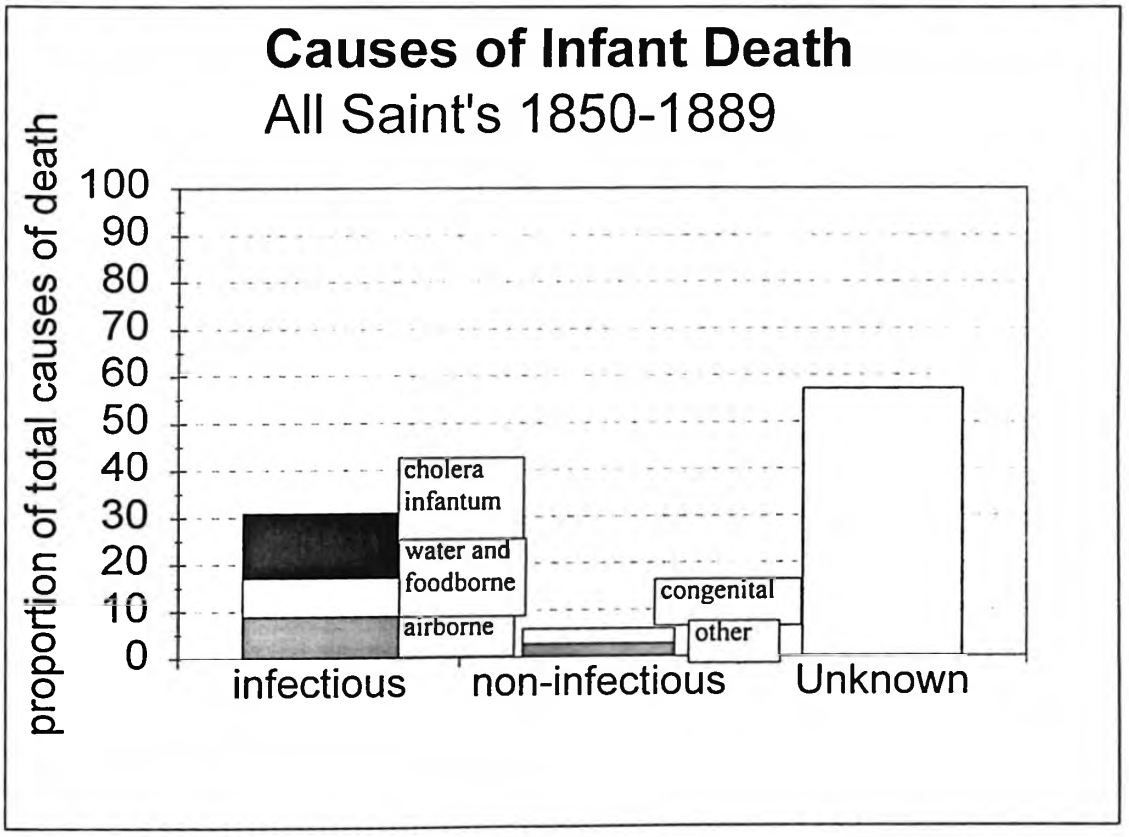

Causes of Infant Death
All Saint's 1850-1889
proportion of total causes of death
100
90
80
70
60
50
40
30
20
10
0
cholera infantum
water and foodborne
airborne
congenital
other
infectious
non-infectious
Unknown

Figure 6

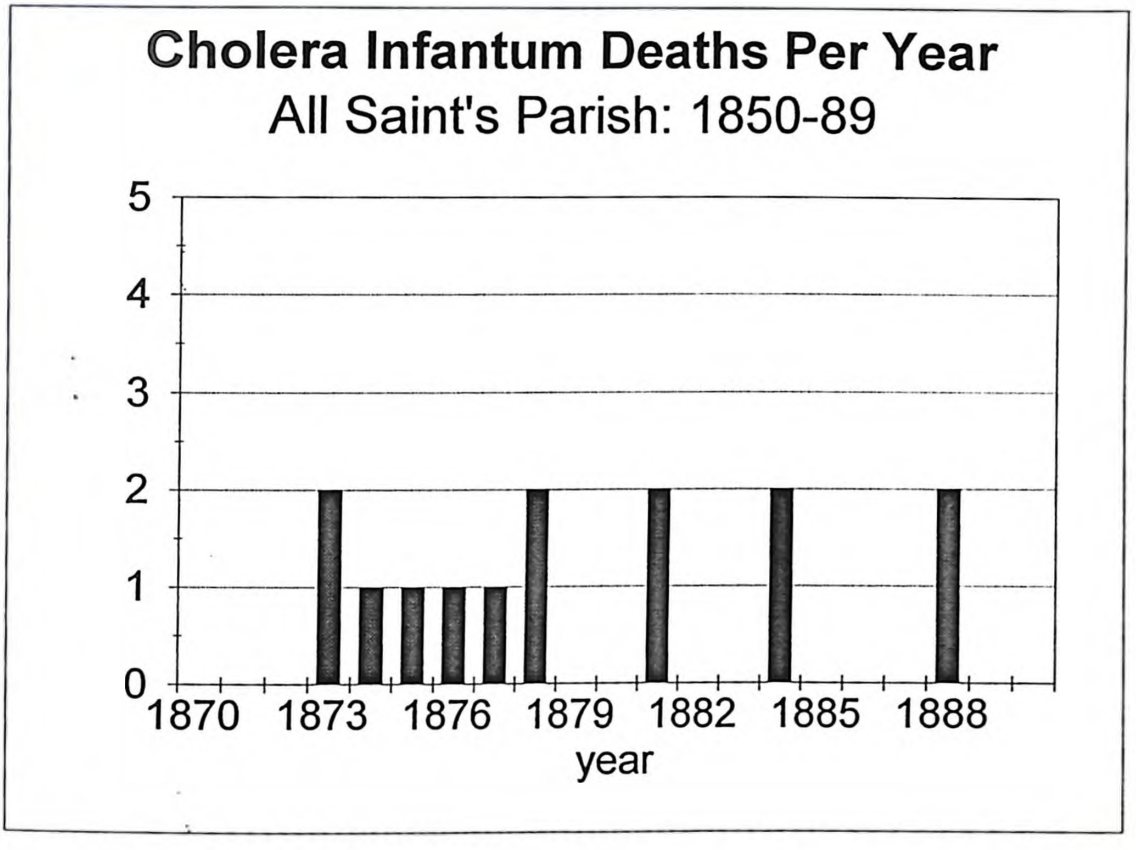
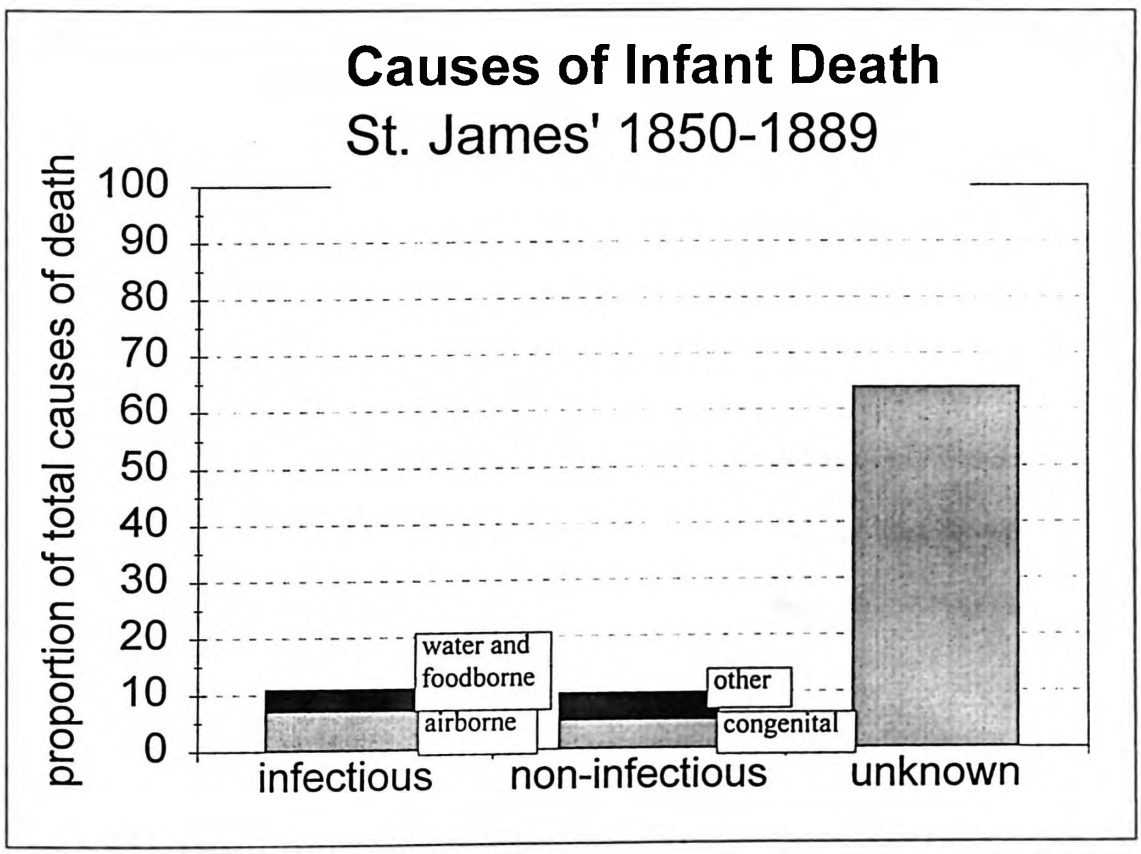

Cholera Infantum Deaths Per Year
All Saint's Parish: 1850-89
5
4
3
2
1
0
1870
1873
1876
1879
1882
1885
1888
year

Figure 7


Causes of Infant Death
St. James' 1850-1889
proportion of total causes of death
100
90
80
70
60
50
40
30
20
10
0
water and foodborne
airborne
other
congenital
infectious
non-infectious
unknown

Seasonality and Infant Mortality

In addition to cause of death, it is important to look at the season in which death occurs. Seasonal mortality data can shed light on the months which were hardest on individuals in the community, as well as give us insight to potential causes of mortality. By comparing the seasons of infant and adult deaths, we are able to see whether infant mortality is reflective of mortality in the community. As there were too few infants dying within any particular year for any annual patterns in seasonality to be detected, infants and adults within all years studied were grouped, respectively, in order to detect any patterns in mortality which may have occurred.

The data for season of death for adults and infants in the All Saint's parish are displayed in Table 17, and graphed in Figures 8. The seasons, in the case of this study, are each composed of three different months; winter includes November, January and February, spring includes March, April and May, summer is composed of June, July and August, and finally,fall consists of the months of September, October and November. This graph shows that while infant deaths appear to peak in the summer, adult deaths appear to peak in the fall and winter months. A chi-square test determined that the differences in the seasons for adult and infant deaths is significant, where $X^2=21.24$, d.f.=3 and $p<0.0000093$. This difference is likely a result of gastro-intestinal upset from contaminated foods and water to which infants would be more susceptible. These findings are consistent with what would be expected for seasonality of mortality in mid-nineteenth century Southern Ontario.

When breaking the seasons into months (Figure 9) we see that the infant mortality peaks in August, dropping slightly in September, while adult mortality peaks in October and January. As grouping data into three month seasons averages the information for the time period considered, this may hide any significant peaks and troughs which may occur in the monthly data. Separating the data into months demonstrates that the season of death is an accurate reflection of the community and not an artefact of grouping the data into four groups.

Table 17

Season of Adult and Infant Mortality: All Saint's Church, 1850-89.

season	adult mortality	% of total mortality	infant mortality	% of total mortality
winter	149	25.1	14	2.4
spring	117	19.7	19	3.2
summer	97	16.3	38	6.4
fall	131	22.1	29	4.9
totals	494	83.2	100	16.9

Figure 8

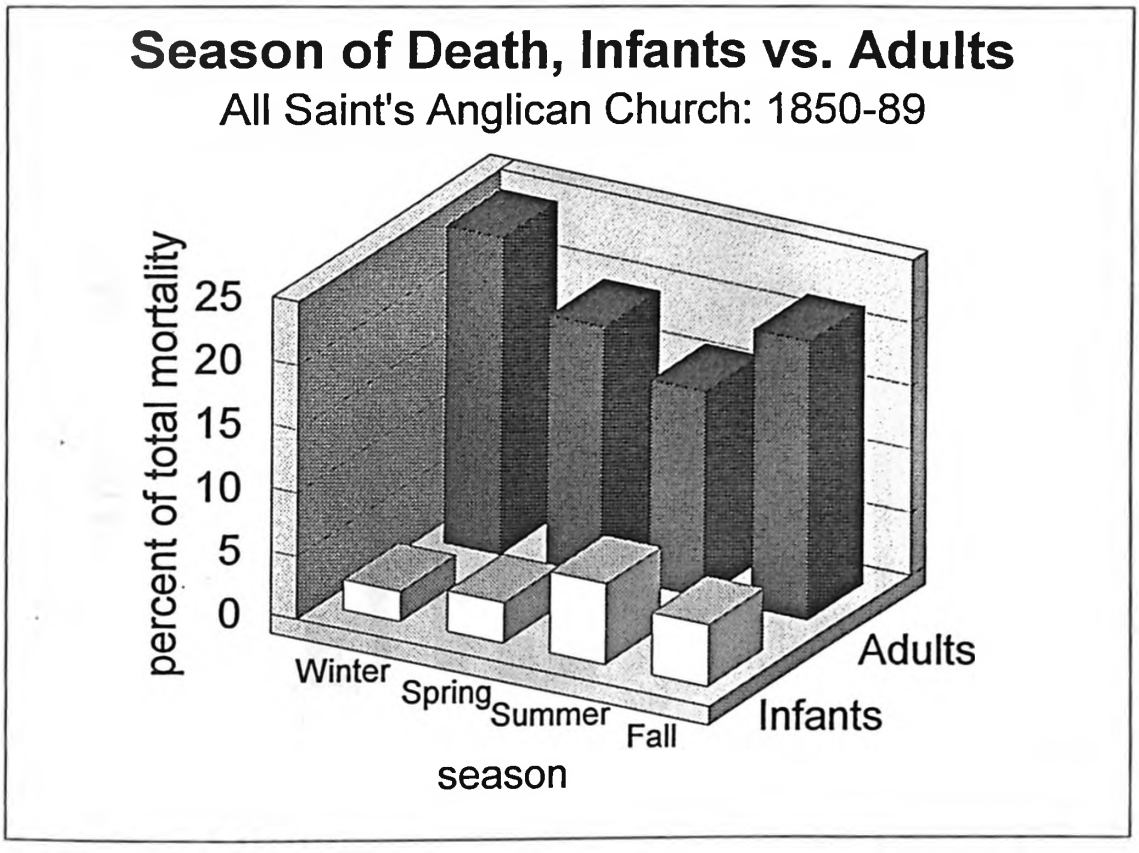
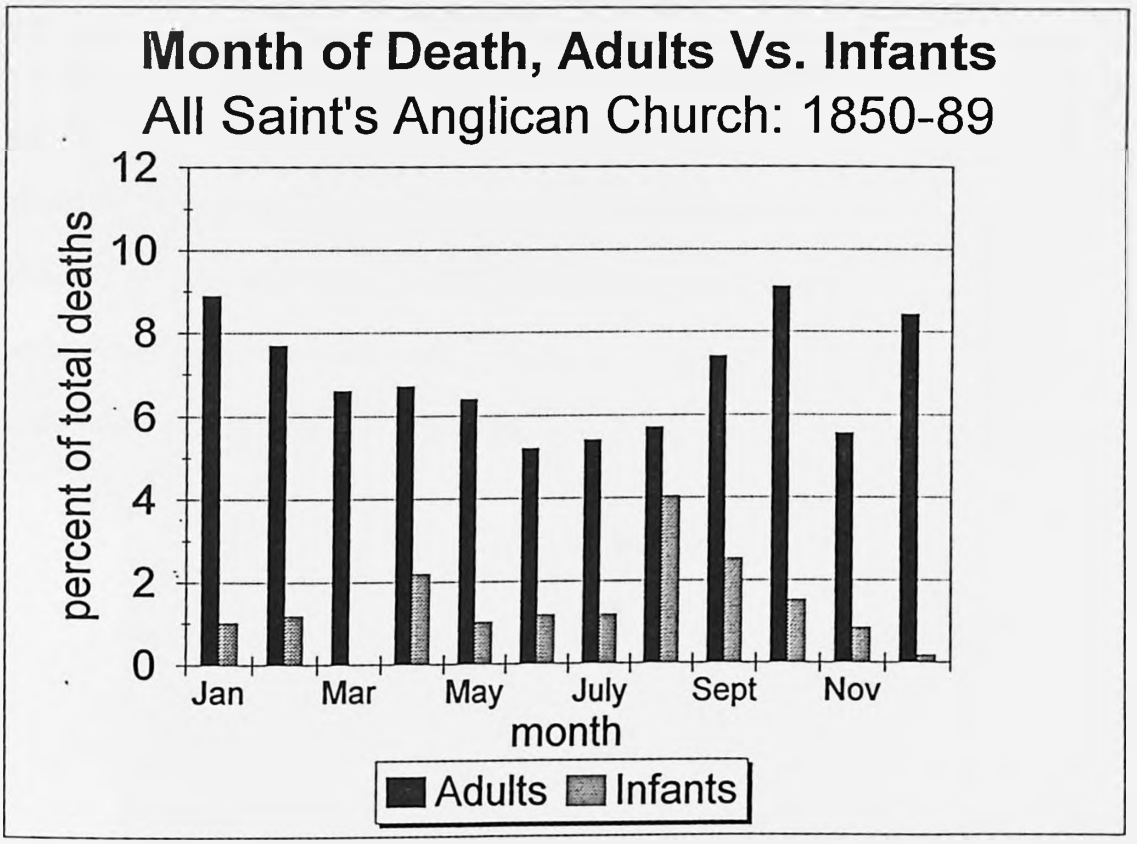

Season of Death, Infants vs. Adults
All Saint's Anglican Church: 1850-89
percent of total mortality
25
20
15
10
5
0
Winter
Spring
Summer
Fall
season
Adults
Infants

Figure 9


Month of Death, Adults Vs. Infants
All Saint's Anglican Church: 1850-89
percent of total deaths
12
10
8
6
4
2
0
Jan
Mar
May
July
Sept
Nov
month
Adults
Infants

The data for the season of deaths for infants and adults for St. James' Church is shown in Table 18, and plotted in Figure 10. From the graph we can see that there is an increase in mortality in the spring, a summer peak, with a slight drop occurring in the fall for both the adults and infants within the community. When this is broken down into month of death (Figure 11), we can see that the peaks in mortality occur in August and in April for infants and adults. A chi-square test found that the differences in mortality by season were not significant for the St. James' Church, where $X^2=3.44$, d.f.=3 and $p<0.328$. Although the summer peak in infant mortality is consistent with the findings at All Saint's Church, it is unexpected that adult and infant mortality would show the same seasonal patterns for the late nineteenth century. Again, these findings are attributed to the small sample sizes and the missing data which appears to bias the study of the St. James' parish.

Table 18

Season of Infant and Adult Mortality: St. James' Church, 1850-89.

season	adult mortality	% of total mortality	infant mortality	% of total mortality
winter	112	19.4	16	2.8
spring	136	23.5	19	3.3
summer	139	24.0	30	5.2
fall	106	18.3	20	3.5
Totals	493	85.2	85	14.8

Figure 10

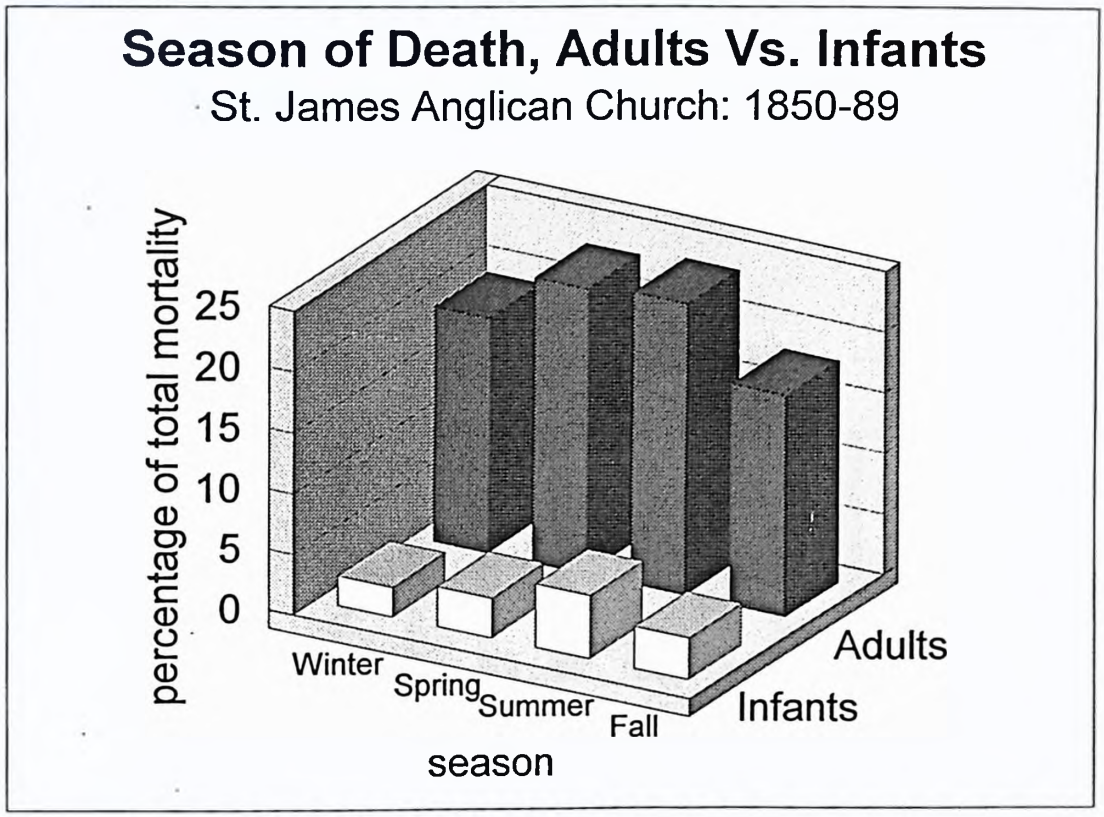
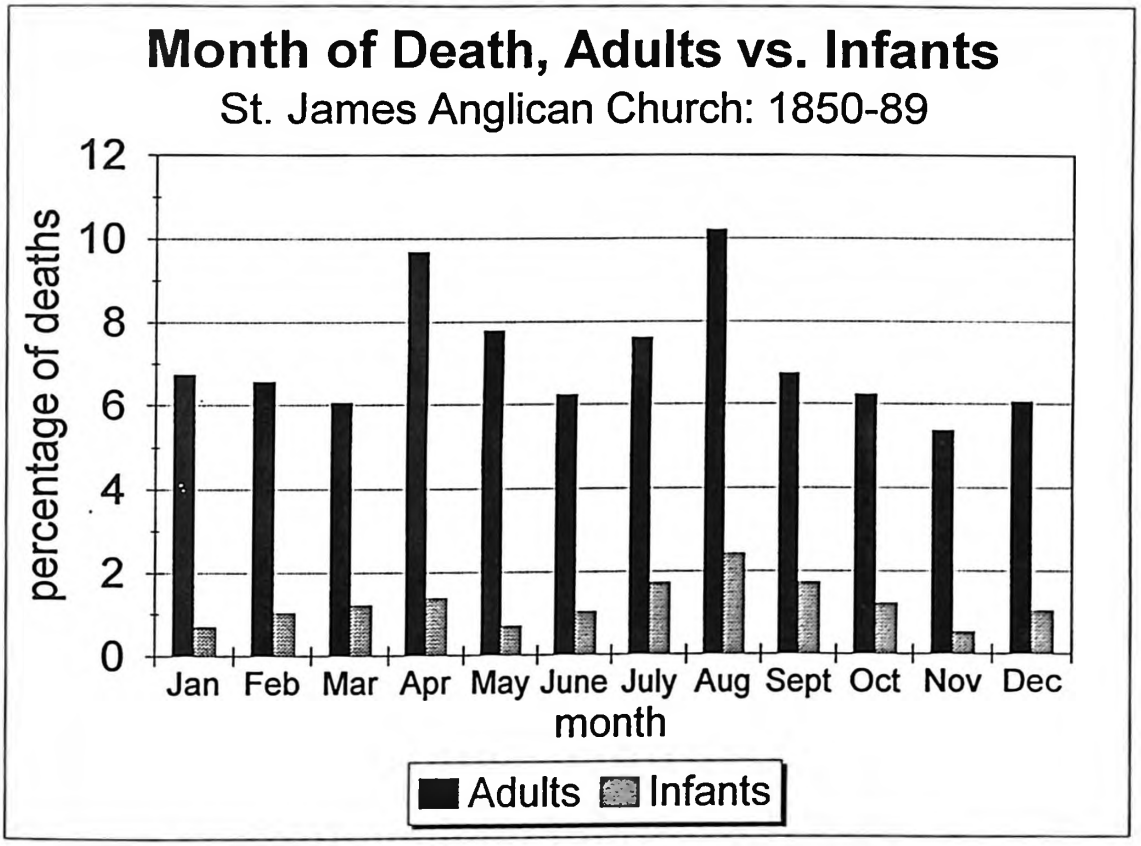

Season of Death, Adults Vs. Infants
St. James Anglican Church: 1850-89
percentage of total mortality
25
20
15
10
5
0
Winter
Spring
Summer
Fall
season
Adults
Infants

Figure 11


Month of Death, Adults vs. Infants
St. James Anglican Church: 1850-89
percentage of deaths
12
10
8
6
4
2
0
Jan
Feb
Mar
Apr
May
June
July
Aug
Sept
Oct
Nov
Dec
month
Adults
Infants

Infant Mortality and the Community

When the years of peak mortality for infants and adults are compared, it can be seen that there are many differences between the two in both parishes (Table 19).

Table 19

Years of Peak Mortality for Infants and Other Deaths:
All Saint's and St. James' Anglican Churches: 1850-89

		All Saint's	all	St. James'	all
decade	rank	infants	others	infants	others
1850-59	1	1854	1853	1852	1851
	2	1853	1854	1853,7	1854
	3	1856,7	1856	1858,9	1858
1860-69	1	1862	1866	1863	1866
	2	1868	1865	1866	1862
	3	1869	1864	1869	1865
1870-79	1	1878	1873	1873	1870
	2	1873	1876	1876	1871
	3	1874,5	1879	1870,1	1875
1880-89	1	1881	1888	1888	1883
	2	1884	1886	1884	1885
	3	1885	1884	1881,2,3	1888

The only cohort where all of the years of peak mortality for both the infants and the rest of the community coincide is 1850-59 for the All Saint's parish. This would suggest that infant mortality in this study is not representative of the mortality of the other age groups in either of the communities.

Conclusion

When analyzing the data for both the All Saint's and the St. James' Churches it becomes apparent that the All Saint's parish is more reflective of expected values than is the St. James' data. The All Saint's IMR, which is between 114 and 120/1000, although slightly less than expected values for the mid-nineteenth century Southern Ontario, is closer to representing what is occuring in the Stamford and Drummondville populations than the St. James' IMR is of reflecting events in the Dundas sample. The ratio of males to females for the All Saint's sample is 105.7, similar to the 105 which is reported as the average sex ratio for human births (Cavalli-Sforza, 1971). This ratio of males to females is also similar to other ratios reported in other mid-to-late century studies (Boatler, 1983:13). This would again suggest that the All Saint's sample is reflective of actual occurrences within the commnity and the region during the time period under study.

Biometric analysis of the the IMR shows that both the All Saint's and St. James' parishes were breast-feeding for at least the first half of infancy. Less exogenous mortality occurs within the first six months in breast-feeding populations due to the nutritional and immunological benefits conferred by breast milk. As this protection decreases in the latter half of infancy, for reasons previously mentioned, an increase in infant mortality occurs. This is demonstrated by the ratio of slopes which are both over 1.0, which suggests that excess mortality occurred in the second half of infancy.

Cause of infant death was difficult to state with any certainty for either population due to the small sample sizes. However, the high rate of deaths attributed to food and

waterborne illnesses in the All Saint's parish, which are more common in the summer months, coincides with the summer peak in infant mortality seen within the records. Years of peak mortality were not consistent between infants and all others within either the All Saint's and St. James' parishes, suggesting that the pattern of infant mortality was not representative of the pattern of mortality for other age groups in the community.

The problems of sample size and biased data for St. James' Church's data, although apparent from the beginning of the analysis, become increasingly important to note as results are calculated. It is important to recognize the effects that these biases have on the results, and take them into consideration upon analysis of the data. The suitability of parish record analysis, as well as the extent to which the parishes' data was representative of events occurring within these communities will be discussed in the following chapter.

Chapter 6

Discussion and Conclusions

In order to gain a more comprehensive view of infant mortality in the mid-nineteenth century in Southern Ontario, the results of this analysis may be compared to similar studies of nineteenth century centers in Ontario and the United States. This will allow us to see if the results obtained for Stamford and Dundas are representative of more wide-spread phenomena occurring in the mid-nineteenth century. This will also aid us in determining whether parish record analysis is a viable method for studying infant mortality in pre-census communities. A comparison of these studies will be useful in determining potential causes of bias found in the records, as well as confirm results concerning infant health and well-being.

Discussion

Through aggregate analysis it would appear that the average IMR for the full study period (1850-89) at the All Saint's Church, 114/1000, differs substantially from the St. James' Church average IMR at 54.5/1000. The IMR's for the All Saint's Church, although slightly lower than expected for IMR's in the mid-nineteenth century Southern Ontario and the Northern United States, as can be seen in Table 20, are still much closer to what is expected than the IMR values for the St. James' Church. As well, the All Saint's Church's IMRs are similar to estimated IMR values of 115 for Ontario in 1891(Haines, n.d.: 72). As the IMR for the All Saint's Church is estimated over a 39 year

period, it would be expected that the averaged IMR values would be higher than the 1891 value for Ontario, due to increased mortality in earlier years. The fact that this does not occur suggests that it is possible that the All Saint's data was also affected by small sample sizes.

Table 20

Infant Mortality Rates For Selected Populations

Population	Infant Mortality Rate	Year	Source
Belleville, Ontario	77 Unadjusted 130 Adjusted	1856-65	Sawchuk et al
Montreal, Quebec		1859	Thornton and Olson[1]
French	244		
Irish Catholic	170		
Protestant	170		
Baltimore, USA	188	1860	Howard[2]
Belleville, Ontario	110 Unadjusted 157 Adjusted	1866-75	Sawchuk et al
Baltimore, USA	278	1870	Howard[2]
Montreal, Quebec		1879	Thornton and Olson[1]
French	188		
Irish Catholic	135		
Protestant	131		
Ingersoll, Ontario	130 M / 115 F	1881	Emery & McQuillan[3]
Lowell, Massachusettes	223	1881-90	Tetrault[4]
New York, USA	248	1885	Meckel[5]
Hamilton, Ontario	173	1900	Gagan[6]
Ontario	155	1900	MacMurchy[7]

(Sawchuk, Burke and Choong, n.d.)

In comparison to these various values, it is obvious that the St. James' Church's average IMR for the study period is far below any expected value. If the quality of the data was not taken into consideration, analysis would suggest that tremendous increases in health care, sanitation and socio-economic status had occurred within the St. James' parish. As there is no documented evidence to support such a drastic increase in infant health for Dundas for the time period under study, this supports the observation that the data for the St. James' Church is biased, most likely resulting from the occurrence of under-representation in infant burials, missing data and gaps in the vital records.

When the IMR's for both parishes are divided by sex, once again problems become evident for the St. James' Church's data. Although the differences between male and female mortality were found to be insignificant for the majority of the cohorts studied, the difference in mortality was found to be significant for the years 1860-69 (X^2=6.5, p=0.01) for the All Saint's Church. The results of this analysis are quite different for the St. James' Church sample, as no significant differences were found between the male and female mortality for any of the cohorts in the time period studied.

It is important to recognize that although a difference was found in the numbers of males and females reported as having died for the 1980-89 cohort at the All Saint's Church, this could have occurred for a variety of reasons. While it is likely that small sample sizes could have influenced analysis, it is not uncommon for females to be underrepresented in mortality samples if they are not deemed as important as males in the population under study. It is possible that more female infants could have had private

burials at home which were not reported to the church, thus under-representing the number of female mortalities reported. However, this is unlikely to have occurred as other studies on mid-to-late nineteenth century communities support the findings of greater male mortality (Trapp, Mielke, Jorde, and Erikkson 1983: 142: Brennan, 1983: 25). For instance, studies at Chappell Hill, Texas, for the late nineteenth century indicate that the infant IMR was 137/1000 and 114/1000 for males and females respectively (Boatler, 1983: 11).

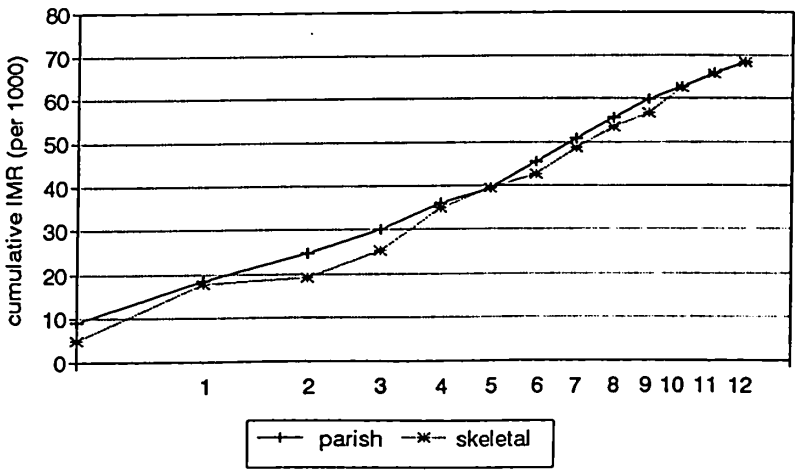
In concordance with expected values for the mid-nineteenth century, the ratio of male to female baptisms was 105.7 for the All Saint's parish. The St. James' Church data gave a ratio of males to females of 101.6, suggesting that there were less males being born, or recorded in the baptism records. As the average sex ratio for human births is approximately 105 (Cavalli-Sforza and Bodmer, 1971), and these values have been displayed in similar historical studies (Boatler, 1983; Brennan, 1983), it can be said that while the All Saint's Church data is representative of a broader phenomenon, the number of male baptisms is under-represented for the St. James' Church. As this is unlikely to have occurred, as male births generally outnumber those of females, and as males are more likely to be recorded in the parish records, this again suggests that the St. James' data must be taken with caution.

Biometric analysis of the parishes suggests that both were breast-feeding populations due to the increase in mortality which occurred after the first six months of life (Figure 4). These observations were corroborated by the ratio of slopes for both

parishes, as All Saint's had a ratio of 1.08, and St. James had a ratio of 1.17. As both ratios of slopes are above 1.0, this suggests that any excess mortality that occurred falls in the latter half of infancy, which is representative of a breast-feeding population. These findings are consistent with other mid-nineteenth century studies of Southern Ontario and the United States. As can be seen in Figure 12, there is excess mortality occurring from 5 to 12 months in the St. Thomas Anglican Church sample, from Belleville, Ontario. Similar to both Stamford and Dundas, the infants in the Belleville sample had a ratio of slope of 1.3 suggesting it was also a breast-feeding population (Saunders, Katzenberg and Boyce, 1995; Moffat 1993).

Figure 12

Cumulative IMR by Month: St. Thomas' Burial Register, 1821-1874



(Saunders, Herring and Boyce, 1995)

Unfortunately, as previously mentioned, the problems with the St. James' Church data limits the usefulness of this analysis. As we know, the low IMR's calculated for the St. James' Church (Table 12) are likely a result of under-representation and missing records, and that male infants are under-represented at birth in the data (Table 13), the cumulative IMR's plotted in Figure 4 are likely a product of this under-representation, as well as small sample size. Due to this, it is evident that the biometric analysis and the ratio of slopes are also flawed and must be used with caution. Therefore, it cannot be said with any certainty that this was a breast-feeding population.

The minimal cause of death information available for both parishes is reflective of trends within vital information registration, as well as a lack of efficiency in recording by the presiding reverends. The data which are available is only representative of the latter half of the study. Although many of the infant deaths were attributed to cholera infantum in the All Saint's parish, it is important to realize that these deaths were likely the results of gastro-intestinal upset and diarrhoea, especially as these deaths were spread evenly throughout the study period, with no peak of cholera infantum deaths in one year which would suggest an epidemic. According to the records, the infant mortality in the All Saint's parish was caused mostly be food and waterborne illnesses (60%). This is consistent with findings from studies in Massachusetts from the mid-to-late nineteenth century (Swedlund, 1990). These studies indicated that problems with waterborne and enteric diseases were considered to be great, so much so that the construction of public water supplies and sewers were considered a top priority (Swedlund, 1990:172) In

contrast, the majority of the infant deaths at the St. James' Church were resulting from congenital problems and airborne infectious diseases. Unfortunately, this data is of limited value due to the small numbers of causes of death recorded. As well, both the All Saint's and St. James' data are limited by potential problems with the interpretations of cause of death by doctors and the recording of cause of death by the clergyman.

Season of death information gave more conclusive results for the All Saint's parish, showing that the differences in season of death for adults and infants were statistically significant. Thus, it appears more infants were dying in the summer months, which would coincide with the high levels of mortality for the infants in the All Saint's sample which resulted from food and waterborne illnesses, as these are more prevalent in the summer months. This also coincides with the seasonal peaks in mortality found in several of the studies in Massacheusetts (Swedlund, 1990). In contrast, the data for season of death was found to be insignificant for the St. James' Church, with high mortality occurring for both adults and infants in the summer months. As these patterns of mortality run contrary to what would be expected for adults in the mid-nineteenth century, it must be assumed that again this is the result of small sample sizes resulting from a lack of consistency in record keeping, under-reporting of vital events and missing data.

As can be clearly seen, there are many similarities existing between the results of the All Saint's Church study and the results of other mid-to-late nineteenth century studies in Southern Ontario and the Northern United States. This suggests that the analysis of the All Saint's data reflects events which were common to various communities in the

mid-nineteenth century. This supports the idea that parish records may be used in the analysis of events within communities prior to the advent of the census. More specifically, parish records can be used as a source of information for determining infant mortality in the mid-nineteenth century in Southern Ontario.

While this study was able to show that much information can be gained from researching parish records for the time period under study, it has also shown that many problems exist with this type of study, which has been exemplified by the analysis of the St. James' Church records. Serious biases existed in this data set which, if not taken into consideration, could easily have seriously affected the interpretation of the data. The lack of recorded information (ie. cause of death data), the small sample sizes and missing records, while likely a product of historical forces, ie. the moving of the church after the First World War, detracted from the quality of data to the extent that the sample was not considered valid for this study. Analysis of the St. James' Church's records alongside the All Saint's Church's records shows how this data may be misinterpreted, and serves as an example of the results which could be expected when encountering a faulty data set.

While parish record analysis has been shown to be useful for offering us insight into pre-census communities in Southern Ontario, the St. James' Church analysis shows the importance of being aware possible biases in the data which may result from missing and incomplete records, small sample sizes and under-registration. By being alert to these potential problems, as well as by being careful to consult other studies from similar

periods, it is possible to make inferences concerning infant mortality in mid-nineteenth century Southern Ontario.

APPENDIX 1

Important Events in the mid-Nineteenth Century in Southern Ontario

Date	Nature of Event
1853	Completion of the St. Lawrence and Atlantic railroad.
1854	Crimean War. Boosts Canadian economy and prosperity into 1860's.
1856	The Grand Trunk Railway between Toronto and Montreal opened.
1857	By-town (Ottawa) selected as capital.
1861-65	American Civil War. Created export opportunities for agricultural and industrial products.
1867	Confederation
1873	PEI. joins Confederation.
1873	Onset of first major post-confederation depression. Effects felt until the late 1890's. Over one million Canadians migrate to the United States.
1876	Intercolonial railway to the Atlantic coast completed.
1879	Creation of the National Policy, focusing on tariffs, the settlement of the West and the creation of transcontinental railways in response to the depression and the out-migration.
1880's	Trade and export with the United States is greater than overseas. A general industrial - urban expansion.
1885	Canadian Pacific Railway completed.
1886	Beginning of CPR transcontinental passenger service.
1895	Industry increases as modern iron-making is commenced in Hamilton, Ontario.

APPENDIX 2

Annual Number of Vital Events: St. James Church 1850-89

Year	Baptisms	Marriages	Burials	Totals
1850	24	4	5	33
1851	43	2	11	56
1852	8	4	11	23
1853	31	3	27	61
1854	24	7	23	54
1855	21	6	16	43
1856	24	9	18	51
1857	23	3	14	40
1858	42	8	10	60
1859	18	4	7	29
1860	30	2	9	41
1861	16	5	12	33
1862	25	4	17	46
1863	20	6	8	34
1864	16	6	15	37
1865	17	5	16	38
1866	8	6	18	32
1867	18	6	9	33
1868	11	6	14	31
1869	19	4	18	41
1870	16	3	8	27
1871	22	5	12	39
1872	15	5	15	35
1873	30	6	31	67
1874	23	9	14	46
1875	20	4	12	36
1876	36	5	22	63
1877	37	4	8	49
1878	21	3	21	45
1879	12	5	18	35
1880	25	2	14	41
1881	25	1	16	42
1882	39	2	11	52
1883	18	9	13	40
1884	11	3	17	31
1885	21	6	11	38
1886	19	4	15	38
1887	23	6	10	39
1888	38	2	31	71
1889	22	7	5	34
Totals	911	191	582	1684

APPENDIX 3

Annual Number of Vital Events: St. James Church 1850-89

Year	Baptisms	Marriages	Burials	Totals
1850	45	6	23	74
1851	58		19	77
1852	50		14	64
1853	39		22	61
1854	45		20	65
1855	49		6	55
1856	47		16	63
1857	54		10	64
1858	60	10	20	90
1859	44	10	14	68
1860	51	10	3	64
1861	51	5	15	71
1862	38	5	17	60
1863	42	13	9	64
1864	28	12	6	46
1865	57	13	15	85
1866	35	15	21	71
1867	36	11	12	59
1868	9	3	7	19
1869	29	10	12	51
1870	52	5	16	73
1871	32	9	10	51
1872	29	5	17	51
1873	49	8	15	72
1874	29	9	9	47
1875	21	4	15	40
1876	21	12	14	47
1877	12	9	12	33
1878	23	9	11	43
1879	28	1	14	43
1880	35	6	13	54
1881	37	3	13	53
1882	8	7	18	33
1883	63	7	30	100
1884	79	6	17	102
1885	41	3	21	65
1886	40	6	15	61
1887	37	8	15	60
1888	46	7	24	77
1889	25	8	15	48
Totals	1574	255	595	2424

APPENDIX 4

Family Group Record

If typing, set spacing at 1½ Page of

Husband Given name(s): EDWARD — Last name: ARNOLD (Farmer) — See "Other marriages"

Born (day month year): 6 Jan 1828 cr Jan 26, 1827 — Place: England
Christened — Place
Died: 25 Mar 1909 — Place
Buried: 27 Mar 1909 — Place: St. John's Cem. Stamford — aged 82 yrs
Married — Place

LDS ordinance dates / Temple: Baptized; Endowed; Sealed to parents; Sealed to spouse

Husband's father Given name(s) — Last name — Deceased
Husband's mother Given name(s) — Maiden name — Deceased

Wife Given name(s): EMMA — Last name: SMITH — See "Other marriages"

Born (day month year): 3 Jan 1831 — Place
Christened — Place
Died: 15 May 1913 — Place
Buried — Place

LDS ordinance dates / Temple: Baptized; Endowed; Sealed to parents

Wife's father Given name(s) — Last name — Deceased
Wife's mother Given name(s) — Maiden name — Deceased

Children List each child (whether living or dead) in order of birth. — LDS ordinance dates — Temple

Sex: F — Given name(s): CAROLINE — Last name: ARNOLD — See "Other marriages"
Born (day month year): 9 May 1877 — Place: Stanford
Christened: 15 July 1877 — Place: All Saints Church N F
Died: 9 Sept 1878 — Place
Spouse Given name(s): aged 1 yr. & 4 mos — Last name: buried - St Johns Church
Married — Place
Baptized; Endowed; Sealed to parents; Sealed to spouse

Sex: F — Given name(s): HARRIET — Last name: ARNOLD — See "Other marriages"
Born (day month year): 1870 — Place: Warwickshire, England
Christened — Place
Died: Dec 12 1910 — Place
Spouse Given name(s): BERESFORD — Last name: HARRIS
Married: 29 Nov. 1906 — Place: Stamford Ontario
Baptized; Endowed; Sealed to parents; Sealed to spouse

Sex: M — Given name(s): Henry — Last name: Arnold — See "Other marriages"
Born (day month year): 10 May 1871 — Place: Stamford
Christened: 28 Sept 1873 — Place: All Saints Church. N.F.
Died — Place
Spouse Given name(s) — Last name
Married — Place
Baptized; Endowed; Sealed to parents; Sealed to spouse

Select *only* one of the following options. The option you select applies to all names on this form.
- Option 1—Family File Send all names to my family file at the ______ Temple
  I will provide proxies for: Baptism Endowment Sealing
  The temple will assign proxies for ordinances not checked.
- Option 2—Temple File Send all names to any temple and assign proxies for all approved ordinances.
- Option 3—Ancestral File Send all names to the computerized Ancestral File for research purposes only, not for ordinances. I am including the required pedigree chart.

Your name: 1871 Census for Niagara Twp
Address: L.C. Edward
see 1851 Census Niagara Twp
Phone — Date prepared
Your relationship to the husband and wife on this form: Husband — Wife

APPENDIX 5

Family Reconstitution. All Saint's Church: 1850-89

Name	Age at Marriage	Age at 1st Child	Number of Kids
?		25	5
Almas, Jane	16	0	0
Arnold, Emma Smith		39	4
Ashbury, Mary Ann			3
Balmer, Emma		33	3
Barker, Mary Hallett			6
Barnett, Anna Kerr Moran		24	5
Bartlett, Catharine Letitia Mary			3
Baxter, Isabel Ann G.		22	5
Baylis, Rose Lamb	married 10 years		6
Biggar, Anna Maria			4
Birkett, Abigail Jane			2
Bland, Emma			2
Blathwayt, Mary Elizabeth		23	4
Bransaka, Anna			4
Breadwood, Susan Elizabeth			3
			4
Broom(e), Elizabeth		34	3
Burrows, Charlotte Augusta			2
Bursley, Annie			4
Buthe, Annie M. C.			3
Carter, Martha Constance		22	2
Clark, Emma			2
Collard, Sarah Ann			5
Collyee, ?			3
Cook, Margaret Perry		20	6
Cornwall, Fanny			3
Correl, Phoebe		31	5
Corry, Mary Baylis		20	6
Coulthurst, Lucy		31	2
Crook, Maria		26	5
Driver, Anna M.			2
Durham, Maria		16	4
Ellegood, Louisa Thomas			4
Ferrin, Elizabeth			2
Fischer, Louis F. Miller			10
Follick, Emilene		21	1
Foreman,Maria Catharine Moore	23	24	2
Foster, Rachel			2
Fralick, Eliza			2
Gallinger, Isabel Ann		22	5
Gallinger, Mary A. Potter	21	22	6
Garnier, Susan Betts		24	4
Glassbrook, Alice(Ann)		20	9
Gowlan, Edith L. Marsh		18	1
Green, Emily Evans Russel		20	8
Hallett, Mary			6
Hamilton, Emily May			4
Hardison, Sarah Ann			4
Hartwell, Elizabeth		18	4

APPENDIX 6

Cause of death classification based on the recorded information in the burial records for the All. Saint's and St. James' parishes.

Airborne

Measles
Congestion
Congestion of Lungs
Meningitis?
Bronchitis
Croup

Food/Waterborne

Dysentry
Teething
Diarrhea
Inflammation of the Bowels
Infant Cholera
Cholera Infantum

Other

Inflamation
Infectious Disease
Hemmorhage of Navel
Decline
Affliction of the Brain
Congestion of the Brain
Convulsions
Paralysis
Infantile Fever

Congenital

General Debility
Premature
Infantile Debility
Liver Complaint
Deformed

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