Supply or demand? — the expansion of mental asylums in Norrland 1900-1960

Contributing authors

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Abstract

Mental disorders account for one of the largest and fastest growing categories of the burden of disease worldwide. However, already in the late nineteenth century, mental illness became recognized as a problem of national importance on both sides of the Atlantic. Before the introduction of psychiatric medicine in the 1950's, the major treatment of mental illness available was institutionalization in a mental care institution. During the period 1900-1959 in all western countries, the establishment of asylums for those with mental illness and physical and intellectual disabilities were unprecedented along with admissions. Despite this, the underlying factors to the selection of some mentally ill individuals into institutions are unclear, since previous studies mainly have relied on data of already confined individuals. By employing longitudinal micro data from Northern Sweden during the period 1900-1959, the aim of this study is to investigate factors contributing to the selection of the mentally ill into institutions. Our research design helps examining whether supply-side factors such as population growth and distance to institutions, along with demand-side factors such as family networks, created the conditions in which asylum admissions increased and varied over time. The results based on event history analysis indicate that both supply and demand factors played a role in explaining the institutionalization of the mentally ill. We find a significant association between confinement and the supply of beds over the period and as similar to previous research, the proximity or 'knowledge' of asylums increased the probability for mentally ill to become institutionalized. Before the expansion of the mental care system, the institutionalization was a driven by the demand of the family. When the supply of institutional care excessed the family-driven demand, the relative increase in institutionalization of individuals without families became greater.

INTRODUCTION

According to the OECD, mental disorders account for one of the largest and fastest growing categories of the burden of disease worldwide. However, already in the late nineteenth century, mental illness became recognized as a problem of national importance on both sides of the Atlantic. Before the introduction of psychiatric medicine in the 1950's the major treatment of mental illness available was institutionalization in a mental care institution. Between the period 1900-1959, in all western countries, the establishment of asylums for those with mental illness and physical and intellectual disabilities were unprecedented along with admissions, also when considering population growth (SOU 1984:64). However, factors behind the increasing incidence in mental disorders on the one hand, and the rise of asylums-beds on the other, has been hard to separate since previous research mainly has relied on asylum records (Adair et al, 1997; Berge, 2007; Dale & Melling, 2007). Nor did all mentally ill end up in institutions. A Swedish study on prevalence of mental illness shows on a steady increase in the number of diagnoses of mental illness until 1929, when a more rapid increase in mental illness took off and persisted until the late 1950's. The study further finds gender and SES differences in mental illness where women's risk of mental illness increased over time (Junkka et al. 2020). As a contrast, database investigations of mental hospital patients argue that gender and SES provide little explanatory power for the understanding of institutionalization (Smith, 2007; Andrews & Digby; 2004; Melling & Forsythe, 1999; Porter & Wright, 2003). It is not clear whether the patterns of institutionalization followed the patterns of mental illness overall in society. By employing Swedish longitudinal microdata, and discriminate between those that received the impairment "mentally ill" and the share of those that were confined into asylums, this paper will advance out knowledge regarding the process of institutionalization of the mentally ill in the hospitalization era.

After Foucault's *Madness and civilization* (1961), Rothman's *The discovery of the asylum* (1971) and Scull's *Museum of Madness* (1979); which traces the cultural evolution of the concept of insanity, the literature has evolved around two major, although related approaches to the historical change of the incidence of mental illness.[1] The first approach focuses on the demand-side stressing the importance of family and kinship relations in the institutionalization of the mentally ill. Researchers such as Tomes (1985) and

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[1] Baur (2013, p. 174) e.g., claims: "The expansion of asylums was driven by complex interactions guided by growing needs from society, power of authorities, and a greater willingness of doctors to specialize in mental illness."

Wright (1998) have highlighted the role of family members for the confinement of mentally ill relatives, also in terms on medical treatment and length of stay. It is generally argued that industrialization eroded local communities and old systems of care by family and kin, making families increasingly prone to seek confinement of their mentally ill relatives, in pace with urbanization. The increased dependency on wage labor made the labor market more competitive, leaving more and more individuals with limited working ability without support (Adair et. al, 1997; Wright, 1998; Porter and Wright, 2003; Miller, 2007; Baur, 2013). Thus, the growth of institutions can be seen as a response to increased market demand (Wright 1997). According to this reasoning, a high level of industrialization and urbanization should increase the risk of families to institutionalize mentally ill relatives. However, research carried out employing indicators on urbanization and industrialization has however not provided any conclusive evidence on the causal effect on institutionalization. The results instead indicate that the presence of family networks in general increased the risk of institutionalization of mentally ill relatives and that the context in which this took place, in rural or urban areas, seems less important.

The second approach concerns the supply-side and builds on "Jarvis' Law" or the distance decay model which assumes an inverse statistical relationship between physical distance from the asylum and the likelihood of admission. Evidence of the Jarvis' Law has been found primarily in studies of the US and Canada, but less often for Britain (Hunter, 1987). Smith et. al (2007) additionally show in a study on late nineteenth century Canada, that the length of stay in the asylum was positively correlated with the distance travelled to the institution; and an inverse relationship was found when correlating distance from the asylum and the likelihood of being readmitted to the same institution. The importance of historical and institutional contexts has rendered a more elaborate view on distance where other factors, such as historical and geographical circumstances, family and marital status have been included in the analysis to explain demand for asylums (Smith et. al 2007; Philo, 1987). Alderman (1997) offers strong empirical support for distance decay but still advocates a perspective which locates the demand for asylum care amongst the families and neighbors of those treated in institutions.

However, without a sample consisting of mentally-ill individuals and the selection of some of these into institutions, it is ambiguous to make reliable inferences regarding what factors that actually caused the institutionalization of the mentally ill. It

further needs to be noted that several studies do not differentiate between diagnoses. Hence, 'admissions' could, according to the diagnoses of the time, be due to everything from depression, lunacy, feeblemindedness, blindness, old age and physical disability.[2] This study will focus on disorders that can be defined as "mental illness". By employing population data where those with the impairment "mentally ill" are identified, we can investigate what factors that caused the selection of some of them into institutions and provide new knowledge of the driving forces for institutionalization of the mentally ill. Our design helps examining whether supply-side factors, such as population growth and distance along with demand side factors such as family networks, created the conditions in which asylum admissions increased and varied over time.

The aim of this study is to investigate what factors that contributed to the selection of the mentally ill into institutions during the period 1900-1959. Drawing on previous research focusing on the role of the family and availability of mental care facilities we will investigate the association between institutionalization and beds per capita, distance to an asylum and family presence.

BACKGROUND

Families' demand for institutional care

All mentally ill were not institutionalized in asylums hospitals or service homes, instead, a considerable share of them were cared for within the home by family and relatives, both before and after the expansion of institutions for the mentally ill. Despite the heavy expansion of asylums, Berge (2007) shows that between the period 1913 and 1928 the rate of mentally ill cared for in the home remained at 23-24 percent.

According to the law regulating the care of the mentally ill from 1913, the prevalence of a mentally ill family member had to be reported to the parish minister and a

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[2] In this study, we use the two concepts of 'disability' *(funktionshinder)* and 'impairment' *(funktionsnedsättning)* interchangeably as the Swedish language does not have any exact equivalent for 'disability' and its distinction from 'impairment', as Norberg has explained (2019, pp. 20–38). Mental disability/impairment refers to long-term limits in people's mental functionalities in our study. While many of the disability concepts we come across in the historical data, such as 'idiocy' or 'insanity', may be offensive due to the derogatory meaning they carry today, we have no intention to offend anyone when using these concepts ourselves to avoid translation issues both across time and language.

medical examination was to be conducted. Berge (2007) stresses the urgency in which authorities often had to act in the case of mental illness within working class families which often lived in crowded quarters and poor circumstances. The knowledge and option to institutionalize an unproductive and sometimes violent and dangerous relative made many families seek for confinement of their mentally ill relatives. For example, historical research has shown on how desperate parents contacted the authorities to receive confinement for violent and dangerous children and showed despair over the log waiting time (Berge, 2007; Björkman, 2001). Hence, institutionalization became a solution for families with few resources to solve the problem with unproductive family members. Institutionalization also became heavily dependent on whether the individual had working ability and could support him/herself (Eivergård and Elfström, 1991). Those that lacked relatives or were too difficult to handle were assigned to the municipality poorhouse. The home care and care in poorhouses of the mentally ill varied but abuse and neglect was not uncommon (Björkman, 2001).

Over time, the outpatient activities of the asylums expanded. A special organization with doctors, nurses and counselors, was set up in the 1940's to operate outside the institution. In 1957, curators at Umedalen hospital reported that more than 3,000 home visits had been made and 400 so called environmental investigations carried out in the region. This way of operating shows that the demand for institutionalization from the 1930's and 40's also was driven by outreach initiatives with the aim to find individuals suffering from mental illness and assess whether they were appropriate for institutionalization. Regulations regarding institutionalization also changed over time. In 1915, the formalities surrounding the institutionalization process was relaxed and in 1929, the mentally ill individual could demand to be confined him- herself (Björkman, 2001).

To determine the possibility to social adjustment while discharging a patient, a special application form was designed in the 1940s at Umedalen Hospital for mapping the patient's home environment regarding the morals and eugenic status of the family and neighbors. Everything from politeness, antisocial behavior, alcohol abuse, possession of weapons, illegitimate children and mental defects was reported (Eivergård, 2003).

Despite the continuous importance of the family for the care of mentally ill relatives, the number of asylum beds expanded rapidly. The patients that were confined in asylums and treated for mental disorders, became disconnected from the family and the

society. This was part of the intervention aiming at distancing the mentally ill from the healthy and productive parts of the population (Björkman, 2001).

The expansion and supply of institutional care

In the early part of the nineteenth century there emerged a movement based on the premise that madness could be cured given proper institutional treatment. Public inspectors travelled through the country to map the living conditions of the mentally, intellectual and physically disabled. In many cases these inspectors viewed the treatments inhuman and dreadful and called for improvements. Hence, the maltreatment of the mentally ill and those with intellectual and physical inabilities at home and in poorhouses was a major cause to the establishment of asylums (Björkman, 2001). From the 1858 Mental Health Charter to the 1929 Mental Health Act, in principle, all admission was a compulsory procedure. With the 1929 law, admission on the patient's own initiative was made possible, while the general right of retention was abolished (Eivergård, 2003).

The development of the regional mental care system can be followed in the statistical material published yearly by the Royal Medical Board from the middle of the 19th century up until the 1970s. This provides detailed information on the institutions in terms of e.g., size, number of patients and beds and characteristics of the patients as well as the area/population covered by each institution. Mental care for patients from the two most Northern counties in the country, Västerbotten and Norrbotten, started to expand during the second half of the 19th century after the government decision in 1823 to organize mental care around so-called central hospitals. Institutional expansion in the less densely populated north was however slow at first. Up until the 1890s all mental patients in the two most Northern counties were sent south the asylum at Gådeå located more less in the middle of Sweden outside the town of Sundsvall. In 1893 the first asylum in the Northern part of the country was built in Norrbotten outside of the town of Piteå in Furunäset. The Furunäset asylum started out with a capacity for 300 patients and served all patients living in Norrbotten and Västerbotten. The largest expansion of mental care in the area under investigation was the establishment of the Umedalen asylum outside Umeå in 1934. By the 1920s mental care was increasingly organized on a county basis in terms of one or several asylums having been built to care for the mentally ill in their respective county. In line with

this organization the government approved funds in 1925 to build an asylum in Umeå to alleviate the asylum in Piteå of the patients living in Västerbotten leaving Piteå asylum to exclusively care for patients from Norrbotten.

The expansion of asylums also benefitted the community since the asylum became one of the area's large workplaces. It offered for many a secure, governmental, year-round employment in an area that otherwise was characterized mostly by agriculture and the timber industry.

Figure 1: Study areas and location of federal mental care institutions treating patients from Västerbotten county

METHODS

Research design and data

To investigate the risk of confinement we applied event history analysis on longitudinal micro data from Northern Sweden covering the period 1900-1960. Population data was collected from digitalized parish records, from the POPUM database, gathered and curated by the Centre for Demographic and Ageing Research, Umeå University (Westberg et.a l, 2016). The sample population consisted of 194,083 individuals who were not confined when entering the study. An individual could enter the study at any point in time after 1900, between the ages of 15 and 60, and was followed until confinement or censoring, which occurred at death, migration, when the study time-period ended in 1960, or when they turned 61. Of the entire sample, 1,559 individuals were subsequently confined (Table 1).

Table 1: Sample population

	N individuals	Avg. years observed	Avg. starting age	Avg. end age
All	183,947	17.59	19.86	37.45
Not confined	182,388	17.60	19.88	37.47
Confined	1,559	16.99	17.81	34.80

Measuring confinement

Information on confinement due to mental illness was attained from notations in the parish records. The ministers recorded the disability status of their parishioners, and were instructed to differentiate between people who were blind, deaf, mute, deafmute, epileptic, physically disabled, intellectually disabled and mentally ill. These diagnoses were all reasons for institutionalization. This study focuses on individuals diagnosed with "mental illness" to get a clean account of what factors that caused confinement. We defined an individual with a mental disorder as someone who was reported with their first mental disorder in the parish registers between 1900–1959. Regarding impairments referring to intellectual and mental disabilities, the instructions obliged the minister to distinguish between mental

illness (sinnessjukdom) and feeblemindedness (sinnesslöhet). Mental illness implied someone having lost their mind, while feebleminded persons were regarded as being mentally ill since childhood. It is clear from the instructions that the minister should separate between congenital disorders (intellectual disabilities) and those that were attained through life (mental disorders, such as depression, antisocial disorders or schizophrenia). In the sources, mental illness was portrayed as any condition where the emotional, cognitive or behavioural state of an individual was disrupting the ability to fulfil a social role, especially to work and be self-sufficient. For the most part, the parish office used this typology to classify individuals when information on mental disorders was recorded. However, ministers also used older derogatory terms to describe people with mental disorders such as insane (galen), and increasingly over time, a discriminating terminology such as melancholic, neurotic, psychopath, psychosis, suicidal and schizophrenia. Hence, we recognize that diagnoses and the incidence of diagnoses are socially constructed and varies over time and space.

Measuring availability of family

Overall, the availability of the family and especially that of parents, has been important factors in the confinement process of mentally ill before the 1960s. As shown here, family support for mentally ill was manly provided by spouses, children or parents. Given that marriage and subsequent children, were significantly lowered by mental illnesses (REF), we limited family availability to parents. Family availability was measured using information on distance to parents' place of residence. An individual was considered to have family present if at least one parent lived within five kilometers, about an hour of walking (Himann et al., 1988). People within this distance have a high likelihood for regular face-to-face interactions, and thus, are more likely to provide social support (Wallman and Wortly, 1990). Furthermore, our longitudinal data allowed us to follow all individuals and their parents over the life course as they moved between locations, capturing family availability at a yearly basis.

Measuring beds per capita

Individuals with mental illnesses could be confined to three types of institutions, state run mental asylums, county hospitals or municipal service homes. In the parish registers, the minister recorded when and where an individual was confined. We use confinement information for all three types of institutions.

Figure 3 describes the development of asylum beds over the entire period 1900-1960 as the number of asylum beds per capita taking the changes in area covered by the asylums and the population development in Norrbotten and Västerbotten into account. The local institutional system increased from 300 beds in the early twentieth century to 1200 beds in the late 1950s. Although the region experienced considerable population growth in the early decades of the century this still meant a sharp increase in the number of treated patients per capita that increased form 1.39 patients per thousand inhabitants in 1911 to slightly over 5 patients per thousand in the mid-1940s were it stabilized.

Figure 3: Total number of beds in federal, state and municipal mental hospitals for the treatment of inhabitants of Västerbotten 1900-1960
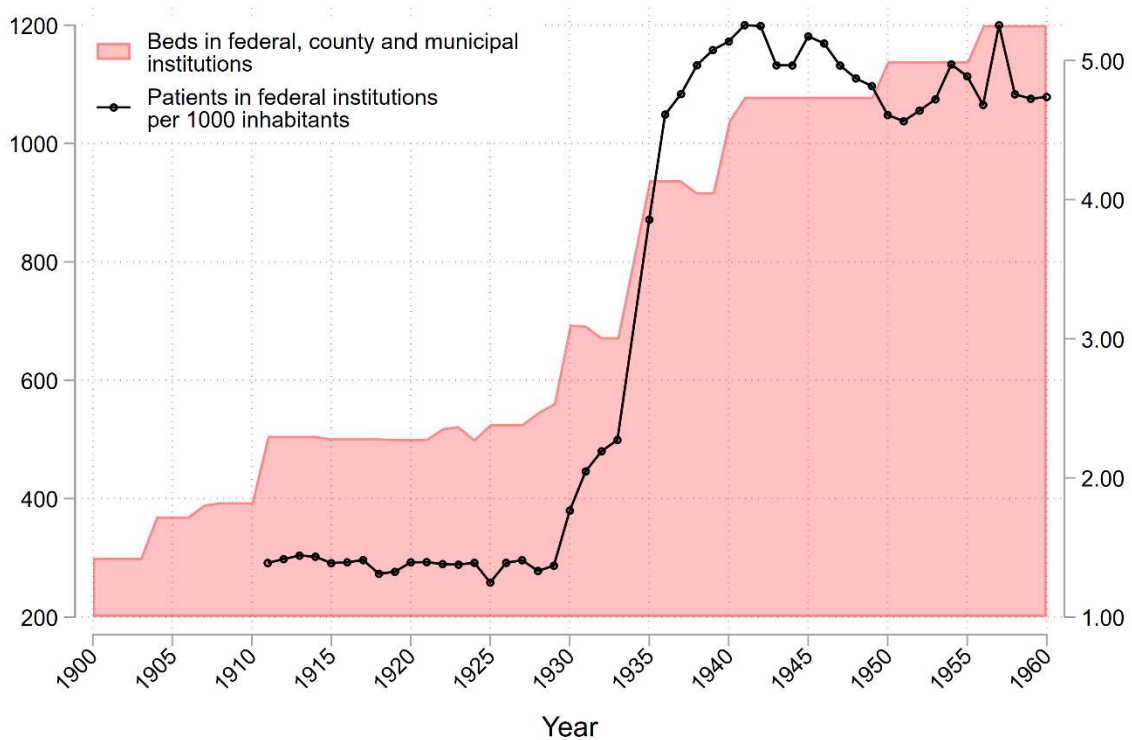
Due to a high demand for more asylum beds Furunäset was further expanded with another 70 beds in 1904. In 1907 the newly constructed hospitals in the residential towns of Norrbotten and Västerbotten, Luleå and Umeå also instated smaller psychiatric wards called "uptake units". By 1911 these wards had 26 beds in total and were intended to treat acutely ill patients until the time they either could be dismissed due to recovery or be transferred to the asylum in Piteå. In 1912 the Royal Medical Board decided that demand for asylum beds needed further expansion and evacuated 110 patients from Piteå asylum to the newly constructed asylum in Västervik built more than a thousand kilometers south of Piteå in the south-east part of the country that could house 800 patients. Of these 800 beds 110 remained reserved for patients from Norrbotten and Västerbotten into the 1930s despite the continued expansion of Piteå asylum in the late 1920s and early 1930s when the capacity reached 540 patients. With additional beds in the regional hospitals and at the asylum in Västervik this meant a total ocapacity of 694 beds for patients in the two northern counties in the early 1930s.

While the planning and building of the new asylum took another 9 years and was finished in 1934 this meant a sharp increase in the number of asylum beds per capita as Umedalen was almost twice the size of the asylum in Piteå having 918 beds already from the start and remined at this dimension until the 1950s when it was further expanded to 1,039 beds. This meant both a sharp increase in the number of available beds for mental care in Västerbotten as well as a sharp decline in the population that should be served by the mental care system in the county. As seen in Figure 3 this resulted in more than a doubling of in the number of treated patients per capita that increased from slightly over 2 patients per thousand inhabitants to more than 5 in the mid-1940s about 10 years after the creation of the Umedalen asylum.

Measuring distance to institutions

Although most patients in the sample population were confined to the mental asylums Furunäset and Umedalen a few were located to more distant asylums in southern Sweden, to the county hospitals in Umeå or to local municipal service homes within the region. Using the recorded name of the institution in the parish records, which individuals were confined to, we identified and geocoded all potential institutions. The data was supplemented with records on founding dates of the institutions to attain accurate time-varying distances to nearest institution. Distance to nearest institution was calculated for everyone on a yearly basis, accounting for the founding of new institutions and individual migration.

Statistical analysis

The risk of confinement was estimated using Cox proportional hazard models. We practiced an open entry sample criterion where subjects could enter at any point in time over the study period (1900-1959) between the ages of 15 and 60. Each individual life course was split into one-year periods (on the first of January each year), to capture the time-varying exposures of beds per capita, distance to an institution and family presence.

Table 2 shows the distribution of the population by the variables used in the analyses, in terms of observed person years number of confined and the confinement rate per 10,000. The estimates were adjusted for a number of confounding factors which could induce selection bias First, we adjusted the measurements for individual attributes which were related to the risk of confinement due to mental illness, namely, social class (Junkka et al., 2020; Lund et al., 2018), gender (Junkka et al., 2020; Steel et al., 2014), migration status (Pekkala and Tervo, 2002; Gilliver et al., 2014) and marital status (Simon, 2002). Second as the distance to institutions were dependent on the place of residence, we adjusted the estimates for attributes of the local area on a neighborhood level; the local socioeconomic structure and population density as a proxy for urbanization (Pickett et al., 2001; Faris and Dunham, 1939). Third, analysis was performed adjusting the measurements for unobserved geographical heterogeneity on a neighbourhood level using random effects models.

Table 2: Description of variables

Variable	Level	Person years	Proportion	Confined	Rate per 10,000
Total	All	3,203,222	100.00	1,559	4.9
Family presence	None	1,903,981	59.44	801	4.2
	Present	1,299,240	40.56	758	5.8
Beds per capita	1-3	1,843,526	57.55	716	3.9
	3+	1,359,695	42.45	843	6.2
Distance to institution in km, percentiles	>4.3	831,300	25.95	406	4.9
	4.3-64.3	770,927	24.07	429	5.6
	64.3-71.8	810,441	25.30	382	4.7
	71.8+	790,554	24.68	342	4.3
Socio status (SOCPO)	Middle Class	237,022	7.40	128	5.4
	Middle Class: Farmers	511,391	15.96	248	4.8
	None	1,549,466	48.37	654	4.2
	Skilled Workers	296,157	9.25	152	5.1
	Unskilled Workers	609,186	19.02	377	6.2
Gender	Man	1,609,624	50.25	760	4.7
	Women	1,593,598	49.75	799	5.0
Time-period	1900-1919	971,486	30.33	249	2.6
	1920-1939	1,288,448	40.22	745	5.8
	1940-1960	943,288	29.45	565	6.0
Local SES Structure	Working class	294,410	9.19	154	5.2
	None	301,789	9.42	101	3.3
	Urban	428,229	13.37	233	5.4
	Semi-urban	1,128,330	35.22	491	4.4
	Rural	1,050,465	32.79	580	5.5
Marital status	Married	1,320,039	41.21	590	4.5

Divorced	4,173	0.13	7	16.8
Unmarried	1,847,446	57.67	949	5.1
Widowed	31,564	0.99	13	4.1

The sampled area consisted of 10 parishes and the population was dispersed over 1,311 villages and towns. Neighborhoods were created by subdividing each parish into smaller areas consisting of neighboring villages and towns. The process, which followed the same methodology developed in previous studies of the region (Junkka, 2018), created 229 neighborhoods. Local socioeconomic structures were constructed by calculating the yearly SES distribution on a neighborhood level, and then classifying each neighbourhood by year into one type of distribution using k-means clustering, creating four types of local SES structures: Urban, Semi-urban, Working-class and Farmers. Individuals without a known place of residence besides being present in the parish were categorized as a fifth group.

The proportionality assumptions of the Cox models were tested using Shoenfield residuals and verified by analyzing the hazard functions. Individual migration status was non-proportional; thus, the analysis was stratified by migration status. All models were constructed and evaluated using the statistical programing language R, the coxme and survival packages (R Core Team, 2020; Therneau 2019)

RESULTS

Supply and demand of mental care in Västerbotten county

The association between beds per capita and confinement is shown in Table 3 as estimated hazard ratios from five different Cox proportional hazard models, build iteratively. The unadjusted estimates of how confinement risk changes as the number of beds per 1000 individuals increases by one unit, shows an increase of 15 percent. This positive association holds even when adjusting for calendar time (Model 2), individual and local attributes (Model 4) and geographical heterogeneity (Model 5). Figure 4 shows how the risk of confinement increases as the number of beds increased over the full observed span of beds

per capita. When the supply of beds expanded from one bed to 4 beds per capita, the risk of confinement increased by 50 percent (HR 1.50 CI 1.26-2.02).

Table 3: Estimated hazard ratios (HR) and P-values of confinement, for individuals aged 15-60. Estimations from Cox proportional hazard models.

Variable	Model 1 HR	P-value	Model 2 HR	P-value	Model 3 HR	P-value	Model 4 HR	P-value	Model 5 HR	P-value
Beds per capita	1.153	0.000	1.111	0.000	1.111	0.000	1.148	0.000	1.148	0.000
Distance to institution					0.998	0.017	0.996	0.000	0.996	0.000
Time-period										
1900-1919 (ref.)			1.000		1.000		1.000		1.000	
1920-1939			1.961	0.000	1.961	0.000	2.047	0.000	2.057	0.000
1940-1959			1.532	0.000	1.540	0.000	2.128	0.000	2.142	0.000
Local SES structure										
None (ref.)							1.000		1.000	
Urban							0.272	0.000	0.27	0.000
Semi-urban							0.768	0.018	0.794	0.06
Working							0.459	0.000	0.451	0.000
Rural							0.776	0.007	0.761	0.005
Population density							1.06	0.010	1.054	0.060
Family available within 5 km							0.895	0.095	0.893	0.089
Social status										
Elite (ref.)							1.000		1.000	
Farmers							0.954	0.684	0.946	0.627
No occupation							1.105	0.323	1.098	0.352
Skilled Workers							0.961	0.739	0.953	0.688
Unskilled Workers							1.228	0.047	1.221	0.054

Marital status					
Married (ref.)				1.000		1.000	
Divorced				3.168	0.003	3.147	0.003
Unmarried				1.915	0.000	1.926	0.000
Widowed				0.915	0.752	0.923	0.775
Gender							
Man (ref.)				1.000		1.000	
Women				1.106	0.052	1.104	0.055
Summary statistics							
N observations	3958924	3958924	3958924	3958924		3958924	
Events	1559	1559	1559	1559		1559	
AIC	34776.029	34692.209	34688.463	32219.611		32197.032	
Random effect N neighborhoods						229	
Random effect SD neighbourhood						0.205	

Figure 4: Hazard ratio of confinement by number of beds per capita compared to 1 bed per capita with 95 % confidence intervals. Estimations from Model 5, see Table 3.
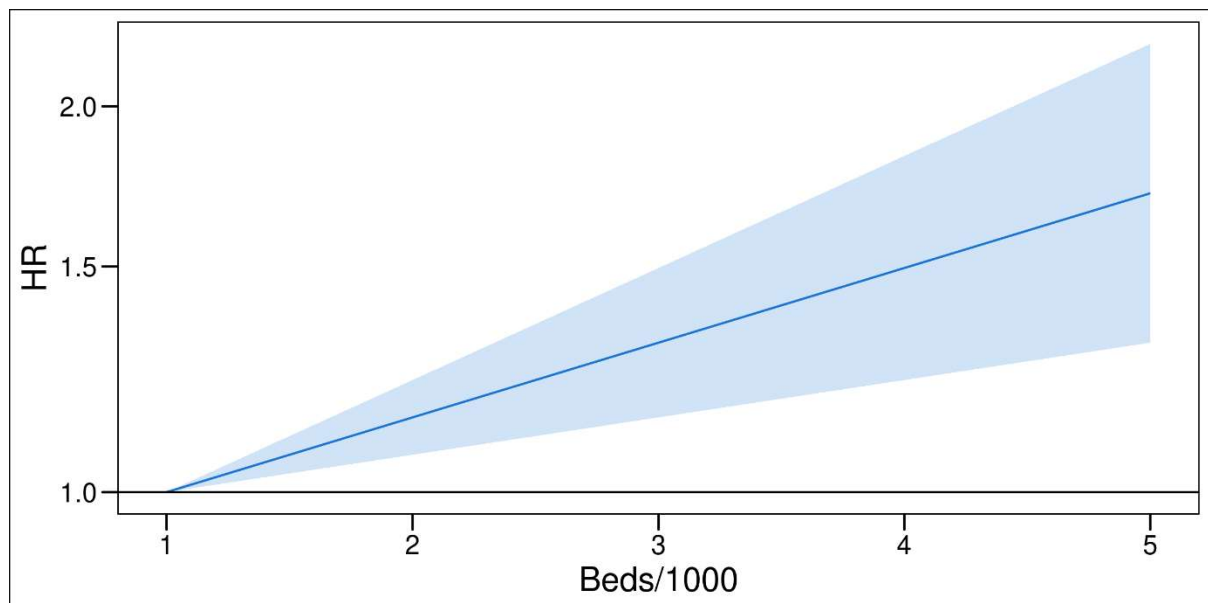
The opposite, negative effects is shown by the association between risk of confinement and distance to an association, Table 3. Similar to the effect of beds per capita, the effect of distance to an institution seems to be independent of possible confounders (Models 3, 4, 5). Figure 5 shows how the risk of confinement changes as a function of distance to the nearest institution in kilometers. The further away an individual was to an institution the lower were the risk of confinement. At 100 kilometer away the risk of confinement were about 40 % lower (HR 0.59, CI 0.39-0.70) than when living in the same location as the institution.

Figure 5: Hazard ratio of confinement by distance to an institution in kilometers compared to a distance of 0 km, with 95 % confidence intervals. Estimations from Model 5, see Table 3.
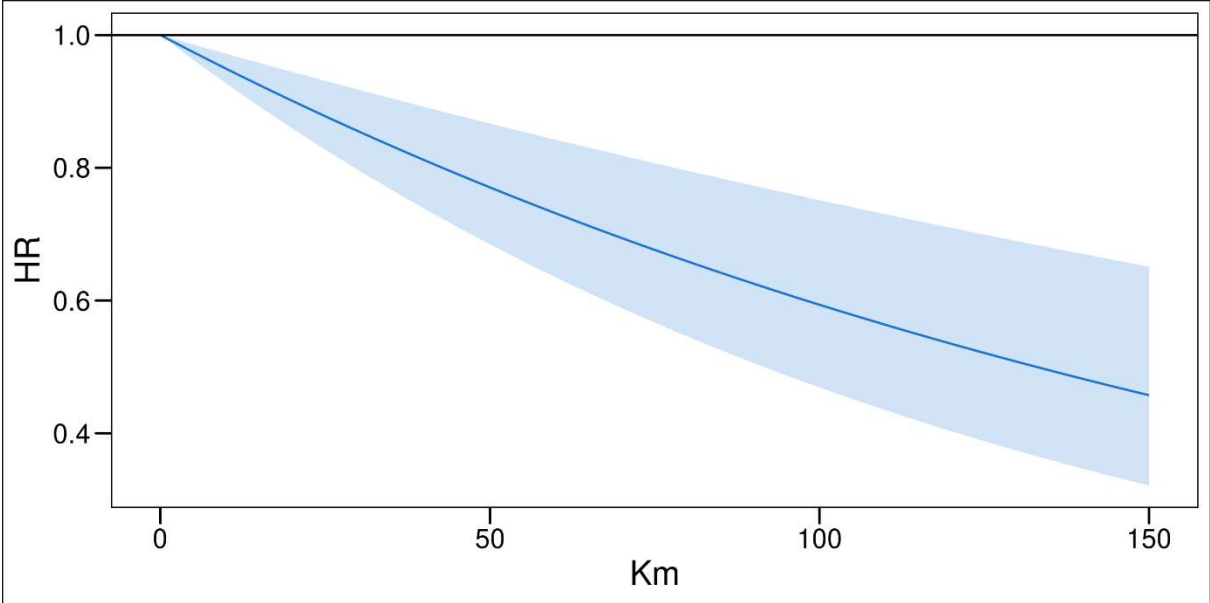

Table 4 shows the estimated hazard ratios for confinement by family availability. As seen by model 1, the overall unadjusted association was positive, if a person had family available within 5 km, they had a 41 % higher risk of confinement than those without a family available. However, the overall effect was confounded (Model 2 and 3), as there was no significant difference in hazard between those with and without family available when adjusting for time-period and individual attributes.

Table 4: Estimated hazard ratios (HR) and P-values for confinement risks, for individuals aged 15-60. Estimations from Cox proportional hazard models

term	Model 1 HR	P-value	Model 2 HR	P-value	Model 3 HR	P-value	Model 4 HR	P-value	Model 5 HR	P-value
Family presence										
None	1.000		1.000		1.000		1.000		1.000	
Present	1.413	0.000	1.082	0.232	1.032	0.633	1.564	0.000	1.561	0.000
Beds per capita					1.147	0.000	1.223	0.000	1.222	0.000
Time-period										
1900-1919			1.000		1.000		1.000		1.000	
1920-1939			2.253	0.000	2.027	0.000	1.988	0.000	1.996	0.000
1940-1959			2.332	0.000	2.105	0.000	2.063	0.000	2.077	0.000
Distance to institution					0.996	0.000	0.996	0.000	0.996	0.000
Local SES structure										
3					1.000		1.000		1.000	
0					0.275	0.000	0.281	0.000	0.281	0.000
1					0.773	0.021	0.798	0.043	0.83	0.129
2					0.466	0.000	0.477	0.000	0.468	0.000
4					0.779	0.008	0.797	0.016	0.783	0.012
Population density					1.061	0.009	1.058	0.013	1.051	0.077
Social status										
Elite			1.000		1.000		1.000		1.000	
Farmers			1.036	0.753	0.944	0.616	0.94	0.589	0.931	0.534
No occupation			1.163	0.134	1.128	0.234	1.126	0.238	1.12	0.261
Skilled Workers			0.98	0.866	0.962	0.746	0.963	0.757	0.955	0.705
Unskilled Workers			1.258	0.025	1.233	0.043	1.238	0.039	1.231	0.045
Marital status										
Married			1.000		1.000		1.000		1.000	

	Model 1		Model 2		Model 3		Model 4		Model 5	
Divorced			3.245	0.002	3.173	0.002	3.127	0.003	3.106	0.003
Unmarried			1.886	0.000	1.873	0.000	1.884	0.000	1.895	0.000
Widowed			0.929	0.795	0.914	0.75	0.913	0.747	0.922	0.772
Gender										
Man			1.000		1.000		1.000		1.000	
Women			1.128	0.019	1.117	0.031	1.113	0.038	1.112	0.039
Interaction										
Family presence * Beds per capita							0.878	0.000	0.878	0.000
Summary statistics										
N observations	3958924		3958924		3958924		3958924		3958924	
Events	1559		1559		1559		1559		1559	
AIC	34815.259		32364.202		32222.175		32207.496		32185.209	
N neighborhoods									229	
SD of neighborhood random effect									0.205	

Instead, the effect of family availability had a strong interaction effect with number of beds per capita (Models 4 and 5 in Table 4). Figure 6 shows the hazard ratio of confinement for the group with family available compared to the group without family available by number of beds per capita. When the supply of institutions was limited and provided one bed per 1000 individuals, the group with family available had a 37 % higher risk of confinement (HR 1.37, CI 1.13-1.66). As the institutions expanded and the number of beds per capita grew, having family available lowered the risk of confinement considerably. With 5 beds per capita, the risk of confinement for the group with family available was 18 % lower (HR 0.82, CI 0.69-0.97) than for the group without family available.

Figure 6: Hazard ratio of confinement of family present by number of beds per capita compared to not having family present, with 95 % confidence intervals. Estimations from Model 5, see Table 4.
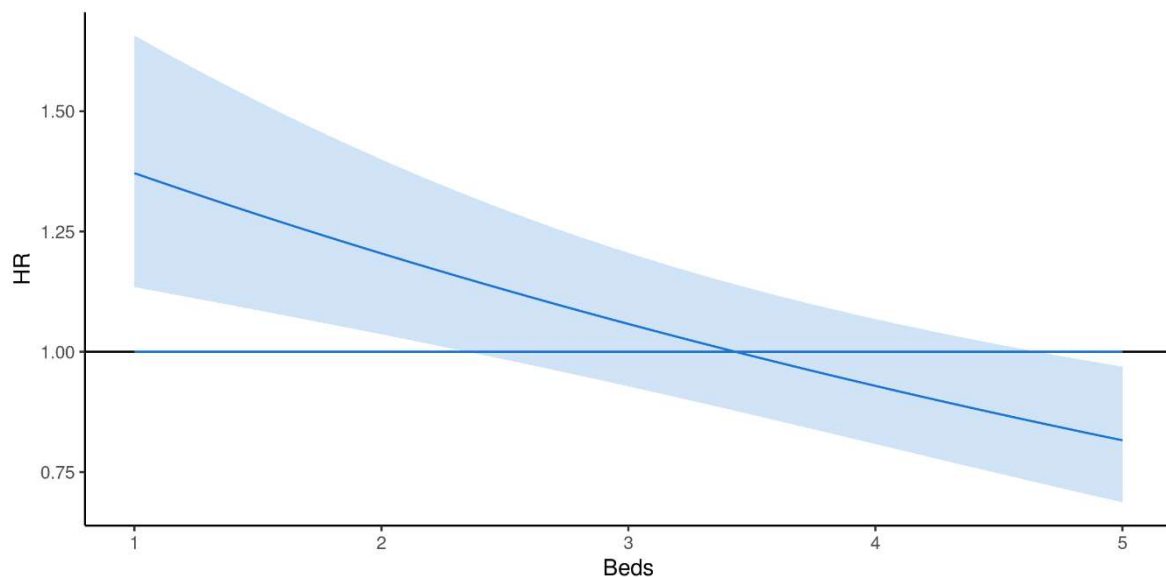
Conclusions

This paper has investigated supply and demand factors for institutionalization of the mentally ill in Sweden, Västerbotten county during the period 1900-1960. There are four main results of the regressions: 1) We found that the association to number of beds per capita was positive, i.e. as the number of beds grew confinement risks increased. 2) The association to distance to nearest institution was negative. The further away individuals lived to their families the lower the risk for confinement. 3) There was further no overall association to family availability. 4) The effect of family availability reversed from positive to negative as the number of beds per capita grew from one bed per capita to 5 beds per capita.

Our results show that the supply of asylum beds increased with the increasing demand for institutionalization. As according to the distance decay model, we also find that distance had a negative association to the demand for confinement. Previous research stresses that the "knowledge" of the asylum made families more prone to institutionalize their relatives. Our results further indicate that the demand of the family was important for institutionalization of mentally ill children. When the supply of institutional care excessed the family-driven demand, the relative increase in institutionalization of individuals without

families became greater. Historical narratives from previous studies further give at hand that the asylum changed their institutionalization methods by a more outreached approach targeting the mentally ill without relatives that could attend to their case – or had an interest in being relieved from a maintenance burden.

Discussion [to be completed]

LITERATURE

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