

BMJ Open Mental health admissions in paediatric populations in North Wales: two cohorts compared 1875–1924 and 1994–2008

Fouad B Basa,¹ Margret Harris,² Mujahid Ali Syed,¹ Joanna Le Noury,² David Healy²

To cite: Basa FB, Harris M, Syed MA, *et al.* Mental health admissions in paediatric populations in North Wales: two cohorts compared 1875–1924 and 1994–2008. *BMJ Open* 2014;**4**:e004331. doi:10.1136/bmjopen-2013-004331

► Prepublication history for this paper is available online. To view these files please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2013-004331>).

Received 31 October 2013
Revised 6 March 2014
Accepted 7 March 2014



CrossMark

¹Hergest Unit, Betsi Cadwaladr University Health Board, Bangor, Gwynedd, UK
²North Wales Department of Psychological Medicine, Hergest Unit, Penrhosgarnedd, Bangor, Gwynedd, UK

Correspondence to
Professor David Healy;
david.healy54@googlemail.com

ABSTRACT

Objectives: To investigate frequency of under-18s admitted to mental health services (MHS) in North West Wales (NWW) between 1875 and 2008. There are claims that 1 in 10 children have a mental illness, but there are little data on their inpatient MHS utilisation.

Setting: Looking at admissions at the secondary care level, three data samples were included; the first comprises historical asylum admissions, the second comprises contemporary admissions to acute psychiatric beds, and the third comprises admissions to district general hospital (DGH) beds that resulted in a mental health coding.

Participants: All were under 18. There were 65 historical patients, 41 contemporary mental illness admissions and 943 DGH admissions.

Primary and secondary outcome measures: The primary outcome measures were diagnoses based on case notes of the historical cohort between 1875 and 1924, as well as details of paediatric admissions to MHS from 1994 to 2008 and paediatric admissions with a mental health component to the DGH in NWW.

Results: The incidence of admission to a mental health bed was 1.55 per year in the historical cohort compared with 2.9 in the contemporary. The overall incidence of admission to any bed in the contemporary cohort was 129 patients per year. There has been a twofold increase in the incidence of admissions for schizophrenia and related psychosis, but this most likely stems from an earlier age of admission rather than a true increase.

Conclusions: There is a greater frequency of hospital admissions for youth under the age of 18 in NWW for mental health today than previously. The rates reported in the DGH sample are consistent with data from community surveys of patients meeting criteria for mental disorders and complement such data when it comes to planning for paediatric MHS. However, they also raise questions about the boundaries between disease and distress.

INTRODUCTION

Official documents and media reports in recent years have suggested that up to 10% of children have a mental disorder.^{1–4} The

Strengths and limitations of this study

- This study has unique access to the 19th and early 20th century asylum records.
- The late 20th and early 21st century diagnoses are drawn from clinical consensus rather than administrative databases.
- This is a study of hospital admission incidence in a rural setting (North Wales) and is therefore one step removed from offering true incidence rates.
- As a retrospective study dealing with historical records, it carries in it the limitations associated with such a method.
- By offering data on general hospital admissions for mental disorders, it sheds some light on pathways to care.

available data underpinning this claim focus mainly on the epidemiology of different disorders and community service utilisation.^{5–11} The best data come from cohort studies in New Zealand, which, using interview schedules in community samples, indicate that over 20% of participants meet operational criteria for disorders codified in current diagnostic manuals for mental health disorders.^{5 6}

There are very few data for rates of inpatient admissions for paediatric populations. We were able to find only five studies that have looked at the inpatient bed utilisation by adolescent patients as part of studying the whole range of mental health services for this age group.^{5 10 12–14}

This study explores the relative frequency of paediatric admissions to inpatient beds for mental health reasons in a contemporary and historical period as well as admissions with a mental health coding to a general hospital bed. These admissions clearly offer admission incidence and prevalence rather than true incidence and prevalence rates for childhood mental health disorders, but they

may also offer some sense of how patients or potential patients are distributed, and the possible boundaries between illness and distress.

METHOD

In this study, we present a unique combination of three sets of data. The first one is a historical cohort of under-18s admitted from North West Wales to the North Wales asylum between 1875 and 1924, a period for which we have a complete set of records. The second group comprises contemporary admissions of under-18s to the Hergest unit, which is the psychiatric unit at North West Wales's district general hospital, between 1994 and 2003. These two datasets have been mined to provide admission incidence rates for a series of adult mental disorders. The third set of data comprises all under-18s admitted to the only North West Wales district general hospital between 2000 and 2008 that resulted in mental health codes on discharge.

The 19th and early 20th century hospital records of the North Wales asylum at Denbigh and records of admissions through the current district general hospital serving North West Wales offer an opportunity to study aspects of mental health service delivery, as geographical and financial constraints have meant that admissions of patients from North West Wales focus on these two facilities in a unique way.^{15 16}

For the purposes of this study, we have taken all case notes of patients admitted to the asylum between 1875 and 1924. All patients were compulsorily detained and their medical and legal certificates outlined the circumstances of detention. The case notes record age, gender, educational, employment and marital status, family history of mental illness and prior mental or physical illness. Patients were routinely assessed for suicidality, violence, seizure-proneness, eating and sleeping habits as well as alcohol intake. The notes provide a detailed assessment of their mental and physical state on admission as well as information on the course in hospital until discharge or death. Prior admissions could be traced back to 1865 and subsequent admissions could be followed up until 1965.

The notes for the historical cohort sample, which are more comprehensive than in other asylums of the period, were sufficiently detailed to permit contemporary consultant psychiatrists to make a retrospective International Classification of Diseases-10 (ICD-10) diagnosis on each patient to allow comparability with the modern sample. The procedure followed was to give the historical records to the consultant from whose sector they would now come. This method permitted some standardisation of diagnostic biases. In the case of the historical sample, it was possible to catalogue all previous and subsequent admissions of that patient. Where there were other admissions, the full details of presenting mental states and clinical course while in the asylum were included as an appendix to their first admission

record and clinicians made a diagnosis with data from all admissions available to them.

All retrospective diagnoses were made according to ICD-10 criteria and had been made before this study was undertaken. The case notes give sufficient information about the onset of symptoms, the presenting mental state and the clinical course of the disorder to make these historical diagnoses reliable. There was full agreement between raters on the diagnoses. Further details of the methodology and procedures underpinning retrospective diagnosis in the asylum sample have been outlined elsewhere.^{15 16}

We have not included in either the historical or contemporary cohorts any patients with a learning disability or developmental disorder. Such patients were diagnosed with idiocy or imbecility in the historical records. We have reviewed all records carrying a diagnosis of either idiocy or imbecility. Of the 13 patients diagnosed with idiocy, all met criteria for a learning disability today. Of the 11 patients diagnosed as imbeciles, six met criteria for learning disability with the remainder having epilepsy (2), organic brain disorder (1) or personality disorder (2).

For the purposes of comparing the incidence of mental health service utilisation between historical and contemporary periods, a contemporary sample was drawn from all admissions between 1994 and 2003 to the Hergest unit, the only mental health inpatient service in the area. This sample offers us not just admission incidence figures for the onset of service utilisation but figures for admission prevalence during the 5-year period from first admission, along with duration of stay data.

In addition to this sample, we have obtained data for all admissions to the adjacent district general hospital that resulted in mental health codes for the years 2000–2008. In 2000, the mental health and general health service merged into one Unit and all admissions were on the same computer system, giving a 3 year overlap (2000–2003) between this sample and the sample of contemporary admissions to the Hergest unit (1994–2003). We traced all patients to exclude any double counting between the general hospital and the mental health unit (Hergest).

We have scrutinised all referrals for admission to out of area facilities to determine whether there were any additional participants not already captured in the databases outlined above.

The overall population of North West Wales has remained the same over 100 years. A census of the population broken down by age in 1891 showed that there were 232 000 people, and in 1991 there were 241 000 in the same area. However, there was a difference in the numbers of children and teenagers between 1901 and 2001; there were 17 810 adolescents aged 15–19 compared to 13 798 in 2001.^{17 18} When comparing historical and contemporary mental health service admissions, we have accordingly age standardised our finding to 2001 figures and expressed the comparative finding in terms of the

incidence of disorders per 100 000 adolescents population. In the period from 1875 to 1924, the structure of the population remained constant such that the figures offered for this group of admissions were unaffected.

RESULTS

Historical mental health facility admissions

Between 1875 and 1924, there were 65 admissions from individuals under 18 years of age to the North Wales asylum. Of these, 27 were for organic disorders, learning disability or epilepsy, leaving 38 functional disorders. Of these 38, 21 were male and 17 female. The average age at admission was 16.3 years with the youngest being 13 years old.

Five years from their first admission, these patients went on to have a mean of 1.55 admissions, but the median number of lifetime admissions was 1.0. Of this patient group, four died in care, all from tuberculosis, three of them within their first admission. Overall, 22 (58%) were discharged recovered and a further 2 (5%) discharged relieved. The remaining 10 (26%) were still in care, having either remained in care since their first admission, or having been discharged and readmitted.

On admission, 11 patients were considered suicidal, and four had attempted suicide prior to their first admission. There were no suicides, 5 years following first admission, but there was one suicide attempt while in hospital.

The historical diagnoses made at time of admission were: 66% for mania, 16% for dementia, 8% for melancholia, 5% for imbecility and 5% were left undiagnosed. A historical diagnosis of mania does not refer to the modern bipolar disorder. Using ICD-10 criteria, these cases have received the contemporary diagnoses outlined in [table 1](#).

There were 7 (33%) male patients diagnosed with schizophrenia, compared with 2 (12%) female patients. However, if organic catatonic syndrome is included with schizophrenia, a higher percentage of female patients—47% (n=8)—had schizophrenia, compared with 37% (n=8) of male patients.

During the 5-year period, these patients spent a mean of 682 days (median of 445 days) in hospital. This total number of 38 functional cases translates into an

admission incidence of 2.14 patients/100 000 population aged 10–17 per year.

Of note, none of the patients in this historical cohort of 65 under 18 years of age fulfilled the diagnostic criteria for autistic spectrum disorder (ASD) or attention deficit hyperactivity disorder (ADHD).

Contemporary mental health facility admissions

Between 1994 and 2003, 41 patients admitted to the Hergest unit were under 18 years of age. Of these, one was diagnosed with learning disability and another with developmental disorder (Asperger's syndrome). Therefore, a total of 39 patients with functional disorder were included. Of these, 20 (51.3%) were female and 19 (48.7%) were male. The average age at first admission was 16.36 years, with the youngest being 14 years old.

[Table 2](#) shows their consensus diagnoses.

More male patients were diagnosed with schizophrenia compared to female patients, 5 (26.3%) and 4 (20%), respectively. There was slightly earlier age of onset for male patients, mean 16.21 year, compared to female patients, 16.50 year.

As a whole, the group had an average of 2.9 admissions in the 5-year period following their initial admission. Patients spent a mean of 87 days (median 21 days) in hospital. This group of 39 patients translates to 8.75 patients/100 000 population aged 10–17 per year.

As of 2005, four of the cohorts were dead. Two died from suicide within 5 years from their initial admission, another two died later, one from suicide and one from an overdose. The 39 patients had 18 suicide attempts.

Of the 39 patients, 24 (61.5%) have no current contact with the mental health service, while 13 (33.3%) have ongoing contact with the mental health service. Excluding the two deaths within the 5-year period, 13 of 37 (35%) have ongoing contact with the mental health service.

Contemporary mental health admissions to general hospital beds

In total, 943 individuals, aged 10–17 years inclusive, received mental health or related coding for 1157 admissions between 2000 and 2008 to both district general hospital

Table 1 Retrospective diagnoses of historical mental health facility admissions (1875–1924) for under 18 years of age

Retrospective diagnoses	Male N (%)	Female N (%)	Total N (%)
Schizophrenia	7 (33.3)	2 (11.8)	9 (23.7)
Organic catatonic disorder	1 (4.8)	6 (35.3)	7 (18.4)
Personality disorder	3 (14.3)	2 (11.8)	5 (13.2)
Psychosis unspecified	4 (19.0)	1 (5.9)	5 (13.2)
Neurotic disorder	1 (4.8)	3 (17.6)	4 (10.5)
Bipolar disorder	2 (9.5)	2 (11.8)	4 (10.5)
Acute transient psychosis	2 (9.5)	0 (0)	2 (5.30)
Manic episode	1 (4.8)	1 (5.9)	2 (5.3)
Total	21 (100%)	17 (100%)	38 (100%)

Table 2 Contemporary diagnoses of mental health facility admissions (1994–2003) for under 18 years of age

Diagnoses	Male N (%)	Female N (%)	Total N (%)
Neurotic disorder	3 (15.8)	6 (30.0)	9 (23.0)
Schizophrenia	5 (26.0)	4 (20.0)	9 (23.0)
Disorder due to drug misuse	3 (15.8)	3 (15.0)	6 (15.4)
Personality disorder	1 (5.3)	3 (15.0)	4 (10.2)
Bipolar/manic depressive disorder	0 (0.0)	2 (10.0)	2 (5.1)
Disorder due to alcohol abuse	2 (10.5)	0 (0.0)	2 (5.1)
Emotional disorder	1 (5.3)	0 (0.0)	1 (2.6)
Acute transient psychosis	0 (0.0)	1 (5.0)	1 (2.6)
Psychological/behavioural disorder	1 (5.3)	0 (0.0)	1 (2.6)
Manic episode	1 (5.3)	0 (0.0)	1 (2.6)
Depressive episode	1 (5.3)	0 (0.0)	1 (2.6)
Problems relating to lifestyle/social environment	1 (5.3)	0 (0.0)	1 (2.6)
Fearful complaint, no diagnoses made	0 (0.0)	1 (5.0)	1 (2.6)
Total	19 (100%)	20 (100%)	39 (100%)

and mental health service beds. On average, therefore, 105 individuals had 129 admissions per year. This is equivalent to 0.56% of the paediatric population of North West Wales. There was a rough doubling of the rate of admissions each year from 10-year-olds to 15-year-olds and a slower rate of increase from 15-year-olds to 17 year-olds.

We have excluded from the total number of admissions seven individuals with a primary learning disability or developmental disorder, including autism, as well as 44 admissions of under 10-year-olds and 70 out of area admissions. There were no under-10s in the historical sample.

Of these 943 individuals, there are 367 who were admitted between 2000 and 2003 and have 5-year tracked outcomes. Of these 367, 179 had no further admissions (48.8%), while 188 (51.2%) had at least one further admission to a medical or psychiatric bed or for a further self-harm episode or pregnancy-related condition (See [table 3](#)).

Within the group of 367, 157 had been originally admitted for self-harm. Of this self-harm group, 39 (24.7%) had a further admission for self-harm within the 5-year period, and of these 17 patients had between 2 and 18 admissions.

Table 3 District general hospital admissions with a mental health code for under 18 years of age

943 individuals	1157 admissions	
121 excluded	7 primary LD /developmental disorder	
	44 under 10	
	70 out of area	
367 had 5-year follow-up data	179 (48.8%) had no further admission	
	188 (51.2%) had one+ admissions	
	157 admitted for self-harm	39 (25%) had another DSH admission
		17 had 2–18 admissions
	18 (5%) had a psychiatric admission within 5 years	12 initially admitted to a DGH bed
		6 initially psychiatric admissions
479 DSH admissions (71% female)	349 deliberate self-harm	
	130 undetermined cause	
231 psychiatric admissions	175 alcohol	
	19 eating disorder	
	16 drug related	
	15 anxiety disorder	
	5 depressive episode	
	1 organic disorder	
207 medical and psychiatric dx (48% females)	112 alcohol	
	39 depression	
	34 anxiety	
	17 drug related	

DGH, district general hospital; DSH, deliberate self harm; LD, learning disability.

Of the cohort of 367 patients, 18 (4.9%) were admitted to a psychiatric bed at some point within 5 years of first admission. Of these 18 patients, 12 had initially had a general hospital admission, while six had an initial admission to psychiatric service. Of the 12 first admitted to a general medical bed, 8 had been admitted for self-harm, while of the remaining 4, 1 admission was abortion linked, 1 was for alcohol use, 1 with anxiety state and 1 for a drug-related disorder.

Of the 18 patients admitted to the Hergest unit with 5 years of first admission to the general hospital, 4 have now been diagnosed with schizophrenia, 2 with a personality disorder, 2 with a neurotic disorder, 2 with a depressive disorder, 1 with an organic disorder, 1 with a developmental disorder and 6 with a substance abuse disorder.

From the overall group of 943 individuals, 479 were admitted because of self-harm, of whom 349 were admitted for deliberate self-harm and 130 for self-harm of undetermined intent. Of these 479, 340 were women (71%).

There were 207 individuals with admissions to medical beds that received dual medical and psychiatric coding, of whom 100 were women (48%). There were 231 individuals admitted to medical beds with a psychiatric diagnosis, of whom 120 were women (51.9%). Finally, 26 were admitted directly to a mental health bed between 2000 and 2008, of whom 7 (26.9%) were women.

The 207 individuals with dual medical and psychiatric coding had 229 admissions between them. In this group, 93 individuals were admitted for acute medical conditions, or chronic conditions such as asthma or diabetes, 50 for trauma or head injury, 30 for abortion or post-partum issues and 34 for psychosocial problems.

In addition to their medical diagnoses, of these 207 individuals, the most common psychiatric diagnosis was for alcohol use (112), followed by depression (39), anxiety disorder (34), drug-related disorder (17), unspecified non-organic (1), personality disorder (1), sleep disorder (1), behavioural disorder (1) and no psychiatric coding (1).

In total, 427 individuals (45.3%) were coded as having an alcohol-related disorder, of whom 233 (54.6%) were male. Of these, 138 were admissions for self-harm. In addition to the 112 patients admitted for alcohol-linked problems noted above, 175 were admitted to a medical ward with a psychiatric diagnosis of alcohol-related problems, along with 2 admissions to the Hergest Unit for alcohol-related problems.

Of the 231 admitted with a primary mental health coding, 175 were admissions for alcohol, 19 had an eating disorder, 16 a drug-related disorder, 15 an anxiety-related disorder, 5 a depressive episode and 1 an organic disorder.

The patients with eating disorders had a median age of 15 years on first admission and have had 40 admissions between them until now.

The group of 26 patients, who had an initial admission to a mental health bed, had 30 mental health bed

admissions between them. The profile for these patients between 2000 and 2008 closely mirrored the earlier 1994 to 2003 sample.

From the whole cohort of 943 patients, there were 5 deaths in the 5-year period from their first admission. One was suicide, 1 drug overdose and 3 were accidents.

Finally, during the years 1994–2008, there have been on average seven referrals per annum to a 5-day/week residential unit outside the catchment area. All of these patients have prior admissions to either the district general hospital or mental health beds outlined above, but their admissions and bed usage are not included in the figures above.

There were variations in the annual numbers of admissions with, for instance, a doubling of the numbers of individuals admitted in 2007 compared with 2002. The biggest contribution to this variation came from self-harm admissions with, for instance, a fourfold difference between 2007 and 2002 for rates of self-harm. In 2007, self-harm accounted for 69.4% of admissions in that year. It is of some interest that the rates of suicide and related verdicts at inquest in the entire population in the area (all ages) were also highest in 2007, and were double those of 2002.

DISCUSSION

This is a first-ever report of rates of inpatient service utilisation for mental health disorders in paediatric populations to include historical and contemporary figures.

Superficially, the figure of 0.56% of children being admitted for a mental health-related problem reported here for North West Wales contrasts with global claims that 10% or more children have a mental disorder. However, it is clear that there is a greater number of children with disorders severe enough to warrant hospital admission than is seen here, making it likely that there are comfortably over 1% of children with a relatively severe mental disorder in community settings.

There are only two other sets of figures indicating the likely incidence of inpatient service utilisation of which we are aware. One comes from the Christchurch cohort.⁵ In this cohort, in which 25% of children in community settings met criteria for a mental disorder at some point in their career (Fergusson DM, Horwood LJ, Lynskey MT, *et al* personal communication), 0.2% were admitted for serious mental disorders, with roughly 1.0% admitted for a mental health-related issue, figures that have some comparability with those offered here. A closer figure (0.6%) was reported by another study (8).

One determinant for admissions to mental health beds in this age group in North West Wales during this period (1994–2003) may have been a comparative lack of paediatric mental health beds (Tier 3 beds). This is likely to change with the development of such services, which may then paradoxically be linked to a greater admission prevalence.

Until such time as we have markers for any illnesses that there may be among these disorders, it will not be



possible to establish the incidence or prevalence of any mental illnesses in community samples in these age groups. In lieu of such markers, admission to a mental health bed, if only by virtue that it points to severity, acts as a proxy for such markers, but it must be borne in mind that admissions in this population may ultimately turn out to be determined more by social than biological factors.

There was a 2-fold increase in the rates of schizophrenia and related psychoses in the contemporary compared with the historical cohort, with a similar doubling in the rates of affective disorder, and a 10-fold increase in admissions for non-affective non-psychotic disorders. In contrast, there were more admissions for the mental consequences of organic disorders in the historical sample while there was an absolute increase in the numbers of admissions for social reasons in the contemporary sample.

Using admissions as a proxy marker, in the present data there might appear to be an increase in rates of schizophrenia, allied psychoses and other serious mental illnesses such as bipolar disorder. In fact, based on the larger dataset of all admissions, not reported here, the incidence of schizophrenia has fallen in North West Wales¹⁵ while the incidence of affective psychoses has remained constant in North West Wales from 1875 to the present day, in the adult population. What we are seeing in the current dataset, therefore, is an earlier age of admission rather than an increase in the incidence of these disorders.

A second issue of some importance is whether the prevalence of diagnoses of community disorders should be taken to mean that these participants are at risk of later mental illness if left untreated in the community. Are anxiety and depressive disorders gateway diagnoses for schizophrenic psychoses or bipolar disorder in later life and would early intervention make a difference to the likelihood of progression? Or are schizophrenic and bipolar disorders qualitatively different disorders and should the provision of inpatient and specialist mental health services be driven by the relative frequency of these latter disorders.

There is some support for the gateway diagnosis point of view in that a substantial number of psychiatric unit admissions had prior admissions to a non-mental health bed. Over a longer time frame, it seems likely that a greater proportion of paediatric patients admitted to a psychiatric hospital will turn out to have had admissions to a general hospital bed that have been recorded here.

Our data point to a need to target services on patients admitted to general hospital beds as in many cases problems leading to later admission will be picked up there first. Aside from those who go on to later mental health admissions, there are many who go on to multiple readmissions to general hospital beds.

It would be of interest to establish what the prior general hospital admission status might be for a representative sample of all mental health admissions later in

life as well as to track over a longer time period the rates of admission from this cohort of DGH admissions. These are neglected areas of research.

Finally, it is worth tracking outcomes for these paediatric samples. The mortality for psychotic patients in the modern period is greater than it was in the historical period.¹⁹ The comparatively small sample here precludes judgement on general rates but the figures give no cause for comfort.

Funding North West Wales Trust Research Grants Committee.

Competing interests None.

Provenance and peer review Not commissioned; externally peer reviewed.

Data sharing statement No additional data are available.

Open Access This is an Open Access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 3.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/3.0/>

REFERENCES

1. Department of Health (2004) Mental Health. 1 in 10 children has a mental disorder. http://www.statistics.gov.uk/cci/nugget_print.asp?ID=1229
2. Ford T, Goodman R, Meltzer H. The British Child and Adolescent Mental Health Survey 1999: the prevalence of DSM-IV disorders. *J Am Acad Child Adolesc Psychiatry* 2003;42:1203–11.
3. Observer Editorial. *Neglecting mental health will cost us dear in the future*. Editorial January 26th 2014. London: Guardian Newspapers, 2014:40.
4. Merikangas K, He JP, Brody D, *et al*. Prevalence and treatment of mental disorders among US children in the 2001-2004 NHANES. *Pediatrics* 2010;125:75–81.
5. Fergusson DM, Horwood LJ, Lynskey MT. Prevalence and comorbidity of DSM-III-R diagnoses in a birth cohort of 15 year olds. *J Am Acad Child Adolesc Psychiatry* 1993;32:1127–34.
6. McGee R, Feehan M, Williams SA, *et al*. DSM-III disorders in a large sample of adolescents. *J Am Acad Child Adolesc Psychiatry* 1990;29:611–19.
7. Ringel J, Sturm R. National estimates of mental health utilization and expenditures for children in 1998. *J Behav Health Serv Res* 2001;28:319–33.
8. Burns BJ. Mental health service use by adolescents in the 1970s and 1980s. *J Am Acad Child Adolesc Psychiatry* 1991;30:144–50.
9. Fleitlich-Bilyk B, Goodman R. Prevalence of child and adolescent psychiatric disorders in Southeast Brazil. *J Am Acad Child Adolesc Psychiatry* 2004;43:727–34.
10. Newman DL, Moffitt TE, Caspi A, *et al*. Psychiatric disorder in a birth cohort of young adults: Prevalence, comorbidity, clinical significance, and new case incidence from ages 11–21. *J Consult Clin Psychol* 1996;64:552–62.
11. Case BG, Olfson M, Marcus SC, *et al*. Trends in the inpatient mental health treatment of children and adolescents in US community hospitals between 1990 and 2000. *Arch Gen Psychiatry* 2007;64:89–96.
12. Merikangas Case BG, Olfson M, Marcus SC, *et al*. Trends in the inpatient mental health treatment of children and adolescents in US community hospitals between 1990 and 2000. *Arch Gen Psychiatry* 2007;64:89–96.
13. Merikangas KR, He JP, Busstein M, *et al*. Service utilization for lifetime mental disorders in US adolescents: results of the national comorbidity survey. *J Am Acad Child Adolesc Psychiatry* 2011;50:32–45.
14. Leaf PJ, Alegria M, Cohen P, *et al*. Mental health service use in the community and schools: results from the four-community MECA study. Methods for the epidemiology of child and adolescent mental disorders study. *J Am Acad Child Adolesc Psychiatry* 1996;35:889–97.
15. Healy D, LeNoury J, Linden SC, *et al*. The rise and fall in the incidence of admissions for schizophrenia: 1875–1924 & 1994–2010. *BMJ Open* 2012; 2:e000447.



16. Healy D, Savage M, Michael P, *et al.* Psychiatric bed utilization: 1896 and 1996 compared. *Psychol Med* 2001; 31:779–90.
17. Office of national statistics, 1891 census.
18. Office of national statistics, 2001 census.
19. Healy D, LeNoury J, Harris M, *et al.* Mortality in schizophrenia and related psychoses: data from two cohorts, 1875 1924 and 1994–2010. *BMJ Open* 2012;2:e001810.