IDI trends in antidepressant dispensing to New Zealand children and young people between 2007/08 and 2015/16

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ABSTRACT

AIM: To examine trends in antidepressant dispensing to childred and young people in New Zealand aged 1–24 years between 2007/08 and 2015/16 using the national Integrated Data Infrastructure (IDI), and to determine whether these trends vary by age, sex, ethnicity and socioeconomic deprivation.

METHODS: In a novel endeavour, data on antidepressant dispensing, age, sex, ethnicity and socioeconomic status were sourced from the IDI, a linked individual-level database containing New Zealand government and survey microdata.

RESULTS: The total rate of dispensing of antidepressants to young people increased by 44% from 1,870 per 100,000 in 2007/08 to 2,694 per 100,000 in 2015/16. Increases were larger for the 13–17 age group than the 1–12- or 18–24-year age groups. New Zealand European/Other ethnicities had the highest dispensing rates (3,623 out of every 100,000 people received an antidepressant in 2015/16), followed by Māori (1,980/100,000), Asian (902/100,000) and Pasifika (819/100,000) had the lowest. Dispensing rates increased with increasing deprivation, except in the most deprived quintile, where rates were lower than all other quintiles.

CONCLUSION: This study demonstrates the value of utilising IDI data for health research, while providing directions for future use, including further linkage of IDI datasets. Overall there was a trend towards an increase in the use of antidepressants across all age, sex and ethnic groups, but notable variation in dispensing between different ethnic and socioeconomic groups. Despite our inability to determine the clinical rationale for increased dispensing of antidepressants, the available data highlight some potentially significant improvements as well as disparities in healthcare.

Worldwide, the use of antidepressant medications has been on the rise with growth in prescribing being observed in England,[1] US,[2] Canada[3] and Australia.[4] New Zealand is no exception; since the early 1990s, antidepressant prescribing has increased steadily.[5,6] Exeter et al (2009), in the most recent population-based study in New Zealand, found a 30.2% increase in antidepressant dispensing between 2004 and 2007. The dispensing rate was higher for women than men, and increased with age, irrespective of gender or ethnicity. In 2015 New Zealand had the 10th highest rate of antidepressant use of the 34 Organisation of Economic Co-operation and Development (OECD) nations.[7]

There is evidence from overseas that this increase in prescribing is also seen in children and young people.[8,9] Karanges et al observed a 25% increase in antidepressant dispensing to Australian children and adolescents in the 3–24 age group over four years from 2009 to 2012. In a study covering

prescriptions in five high-income countries from 2005 to 2012, Bachmann et al observed increases in the number of young people receiving an antidepressant of between 17.6 to 60.5%. To date, there have been no published studies of antidepressant use by New Zealand children and young people.

Antidepressants are generally defined as medications used to treat depression and related mood disorders. They include a range of drugs from different chemical families. Most 'antidepressants' are also used for other clinical purposes, especially in children and young people. For example, serotonin-specific reuptake inhibitors (SSRIs) such as Fluoxetine, Citalopram and Paroxetine are often used to treat anxiety disorders,[10] and tricyclic antidepressants (TCAs) such as Amitriptyline and Nortriptyline are used to treat pain disorders,[11] enuresis[12] and insomnia.[13] Despite their known clinical benefits,[14,15] there has been concern about overuse of antidepressants in children and young people out of keeping with treatment guidelines[10,16] and the potential for increased risk of suicidal ideation.[17]

Enhanced understanding of patterns of antidepressant prescribing is made possible in New Zealand via the Integrated Data Infrastructure (IDI),[18] a large research database containing a wide range of administrative and survey data about people and households. Data in the IDI is held in a secure environment and can be accessed by approved researchers only for projects that are in the public interest. Statistics New Zealand's 'five safes' framework[19] is used to ensure data privacy is protected. Only approved researchers can use the IDI, for projects with a statistical purpose for the public good, using de-identified data, accessed in secure settings, and statistical results that are confirmed as confidential and checked by Statistics New Zealand before being released. Use of IDI data may enable more accurate investigation of health-related activity, including medication prescribing by age, gender and ethnicity. It also permits analysis of dispensing by deprivation status, a first for New Zealand data.

The present study examines antidepressant dispensing trends among New Zealand children and young people aged 1–24 years over the period 2007/08 to 2015/16. The aims of the study are:

- To gauge the utility of currently available IDI data for measuring antidepressant dispensing levels and trends at a national level
- To describe trends in antidepressant dispensing to children and young people
- To explore how antidepressant dispensing to children and young people varies by gender, age, ethnicity and socioeconomic status.

Methods

Data sources

This study used data from Statistics New Zealand's Integrated Data Infrastructure (IDI)[18] as described above. Data on antidepressant dispensing were drawn from the community pharmaceutical dispensing collection. The data extracted for this study covered all subsidised community (pharmacy) antidepressant dispensing for people in New Zealand aged 1–24 years (ages were calculated at the end of each fiscal year) for the nine-year period from 1 July 2007 to 30 June 2016. This included prescriptions written by primary care and specialist (secondary and tertiary) health services. All dispensing of antidepressants was included in the study as the reason for prescribing cannot be determined. For the purposes of this study, repeats (repeated dispensings of medications from the same prescription) were counted as separate dispensings. Each separate medication was also counted as a separate dispensing, even if it was dispensed at the same time.

Antidepressant classes

The 19 medications considered to be 'antidepressants' on the pharmaceutical schedule for the period of interest included five selective serotonin re-uptake inhibitors (SSRIs) (Citalopram, Fluoxetine, Paroxetine, Escitalopram and Sertraline), three monoamine oxidase inhibitors (MAOIs)/ reversible inhibitors of monoamine oxidase A (RIMAs) (Tranylcypromine, Phenelzine and Moclobemide), a serotonin and noradrenaline re-uptake inhibitor (SNRI) (Venlafaxine), eight tricyclic antidepressants (TCAs) and related agents (Amitriptyline, Nortriptyline, Dosulepin, Doxepin, Clomipramine, Imipramine, Trimipramine and Maprotiline), a tetracyclic antidepressant

(TeCA) (Mianserin), and a noradrenergic and specific serotonergic antidepressant (NaSSA) (Mirtazapine).

Ethnicity

Ethnicity was measured in total response format, allowing an individual to be a member of multiple ethnic groups. Four major ethnic groups were used in this study: New Zealand European/Other (combination of the European and Other Level 1 groups); Māori; Pasifika and Asian. The Middle Eastern, Latin American and African (MELAA) group was not examined due to small population size. Ethnicity was sourced from the first available source in the following order: Census; birth records; health.

Socioeconomic status

Socioeconomic status was measured using the New Zealand Deprivation Index (NZDep) 2013.[20] NZDep is an area-based measure that assigns a deprivation score based on the meshblock in which an individual was living. Scores were collapsed into quintiles with quintile one representing the least deprivation and five the greatest. The IDI contains information about address updates that individuals have provided to government agencies. These can be used to determine place of residence at a given date.[21] In this study, meshblock of residence (needed to determine NZDep) was defined at the end of the fiscal year. The most recently registered meshblock of residence before the end of the fiscal year was used. If an individual did not have any registrations prior to the end of the fiscal year, the first update in the 12 months after the end of the fiscal year was used.

Data management

Dispensing and associated demographic data were extracted using SAS 7.1 and then analysed using StataMP 15 within the IDI environment. The following standard cleaning steps were applied to the data: Antidepressant dispensings were included for order type 1 only (others are for oncology or dispensings not to a particular person such as a bulk supply order); all antidepressant dispensings with a formulation ID "NULL" or 391725 "brand switch fee" were removed; dispensings were removed when the date of dispensing was after the individual's date of death or before their date of birth.

Ethics approval

The University of Otago Human Research Ethics Committee reviewed the study for ethics consideration. The study was reviewed as a 'Minimal Risk Health Research—Audit and Audit related studies' proposal and was approved.

Calculating antidepressant dispensing rates

Dispensing rates were calculated by dividing the number of people who were dispensed an antidepressant in a given fiscal year by the number of people in the New Zealand resident population in that fiscal year. For age-specific rates, ages were calculated at the end of the fiscal year. Dispensing rates are presented in this paper as 'per 100,000 population'. Population denominators by fiscal year were calculated using existing methods for estimating a resident New Zealand population from the IDI.[22,23] More specifically, this method included people whose presence in New Zealand was indicated by activity in key datasets. Individuals who had died or moved overseas were excluded. The total resident population generated using this method was within 2% of the official estimated resident population estimate.

Results

Number of antidepressants dispensed

Over the nine-year study period there were approximately 1.35 million antidepressant dispensings to children and young people aged 1–24 years in New Zealand. The total number of annually dispensed medications increased 68% over the time period (from 111,171 in 2007/08 to 186,396 in 2015/16). Over two-thirds (68%) of the medications dispensed during the time period were for SSRIs. A further 17% were for TCAs and 13% for SNRIs. MAOIs/RIMAs, NaSSAs and TeCAs combined accounted for approximately 2% of medications dispensed. Over the nine-year period SNRI dispensing more than tripled (up 222% from 9,783 in 2007/08) and SSRI and TCA dispensing increased by 58% (from 78,315) and 34% (from 22,266) respectively.

Table 1: Annual dispensing rates (per 100,000 population) overall, by gender and age.

Fiscal year	Overall	Male	Female	1–12	13–17	18–24
2007/08	1,870	1,172	2,603	147	1,361	5,149
2008/09	1,946	1,236	2,693	131	1,372	5,363
2009/10	2,091	1,365	2,858	134	1,513	5,686
2010/11	2,177	1,437	2,960	139	1,614	5,845
2011/12	2,252	1,504	3,044	133	1,685	6,042
2012/13	2,431	1,607	3,303	137	2,021	6,364
2013/14	2,525	1,675	3,427	147	2,193	6,511
2014/15	2,687	1,773	3,662	159	2,410	6,834
2015/16	2,694	1,777	3,675	170	2,494	6,790
% Change*	44.1	51.6	41.2	15.6	83.3	31.9

*% Change refers to the percentage change in dispensing rates from 2007/08 until 2015/16.

Rate of children and young people receiving antidepressants

The rate of children and young people aged 1–24 years who received an antidepressant increased over the study period from 1,870 per 100,000 in 2007/08 to 2,694 per 100,000 in 2015/16 (Table 1). Annual rates for females were just over twice those of males (although that ratio narrowed slightly over the study period) and by 2015/16 female rates were 3,675 per 100,000 compared to 1,777 per 100,000 for males. Antidepressant use increased by age with 170 per 100,000 in the 1–12 age group in 2015/16 compared to 2,494 in the 13–17 age group and 6,790 in the 18–24 age group. Across all age groups, rates increased over time with the greatest increase being in the 13–17 age group experiencing an 83% increase, more than double that of the other age groups.

Figure 1 shows the rates of children and young people receiving antidepressant dispensing annually by sex/age category. Within age categories dispensing rates were generally higher for females than for males with the exception of the 1–12 age group, where annual rates for males were

Figure 1: Dispensing rates by age and gender, 07/08 to 15/16.

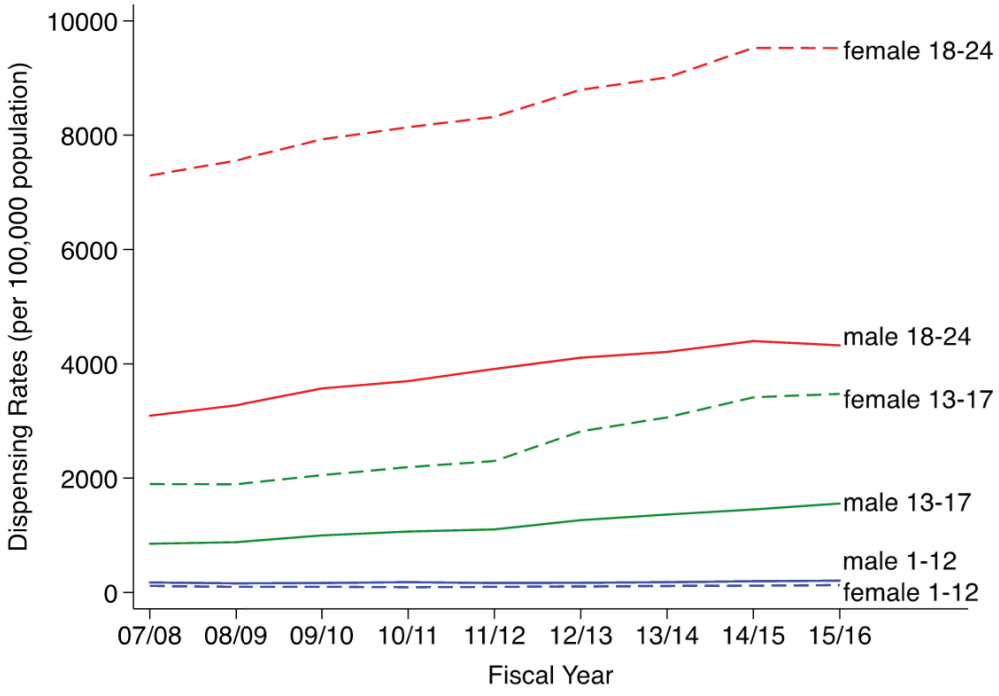


Table 2: Annual dispensing rates (per 100,000 people) by drug class and age category.

	SSRIs			TCAs			SNRIs		
Fiscal year	1–12	13–17	18–24	1–12	13–17	18–24	1–12	13–17	18–24
2007/08	71	1,001	4,122	77	410	1,176	2	26	261
2008/09	76	1,017	4,230	56	403	1,241	1	24	313
2009/10	82	1,151	4,508	54	406	1,279	S	24	353
2010/11	90	1,215	4,612	50	441	1,293	S	33	371
2011/12	89	1,287	4,736	45	438	1,372	S	32	416
2012/13	95	1,594	4,993	45	490	1,412	S	38	438
2013/14	100	1,745	5,073	49	489	1,440	S	45	537
2014/15	117	1,948	5,307	42	517	1,460	S	65	647
2015/16	128	2,017	5,195	42	525	1,464	1	71	739
% Change*	80.6	101.5	26.0	-45.6	28.0	24.6	-42.4	177.7	183.4

*% Change refers to the percentage change in dispensing rates from 2007/08 until 2015/16.
S Suppressed due to low (<6 observations) count.
Due to the low number of dispensings TeCAs, NaSSAs and MAOIs are not presented.

typically about 60% higher than females. Females aged 18–24 had the highest rates of antidepressant dispensing, with almost 1 in 10 (9,522 per 100,000) receiving an antidepressant in 2015/16. Rates for all age-sex groups increased over the time period.

Dispensing rates by drug class varied across age categories and over time (see Table 2). SSRIs were the most frequently dispensed drug class in all age groups. Over time SSRI rates increased but the magnitude of this increase was greatest for the younger

Table 3: Annual dispensing rates (per 100,000 population) by drug for 1–12 age group.

	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	%Change*
Amitriptyline	39	30	34	30	28	29	34	29	29	-26.1
Citalopram	15	19	21	23	21	21	23	24	18	14.7
Clomipramine	1	S	1	1	S	S	S	S	S	-
Dosuleprin	3	S	S	S	S	S	S	S	S	-
Doxepin	3	2	S	1	1	S	S	S	S	-
Imipramine	21	16	12	12	9	10	9	7	7	-69.3
Nortriptyline	10	8	7	6	7	5	7	7	7	-33.2
Fluoxetine	51	57	60	66	64	66	67	79	89	76.0
Moclobemide	S	S	S	S	S	S	S	S	S	-
Venlafaxine	2	1	S	S	S	S	S	S	1	-61.6
Mirtazapine	S	S	S	S	S	S	S	S	S	-
Escitalopram	S	S	S	S	1	4	7	8	8	-
Sertraline	S	S	S	2	4	6	8	13	19	-
Paroxetine	8	4	3	2	2	1	S	S	S	-

S Suppressed due to low (<6 observations) count.
*% Change refers to the percentage change in dispensing rates from 2007/08 until 2015/16.
Percentage changes are not calculated if either the 07/08 or 15/16 value is suppressed or missing.
Due to low numbers Trimipramine, Mianserin, Maprotiline, Tranylcypromine and Phenelzine are not presented.

Table 4: Annual dispensing rates (per 100,000 population) by drug for 13–17 age group.

	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	%Change*
Amitriptyline	256	248	255	282	276	292	300	319	334	30.5
Citalopram	363	359	441	441	423	443	419	439	248	-31.5
Clomipramine	7	9	6	6	7	9	5	5	4	-39.7
Dosuleprin	16	13	13	10	8	7	7	8	8	-50.3
Doxepin	24	26	21	16	15	17	13	13	10	-57.8
Imipramine	24	26	17	16	15	15	13	9	8	-66.2
Nortriptyline	98	97	108	125	136	167	172	182	186	88.9
Fluoxetine	649	681	756	804	828	1,023	1,093	1,184	1,287	98.3
Moclobemide	5	6	5	5	3	4	4	2	S	-
Venlafaxine	26	23	24	32	33	38	45	65	71	167.8
Mirtazapine	S	S	S	10	14	18	23	29	10	-
Escitalopram	S	S	S	10	49	118	167	214	267	-
Sertraline	S	S	S	28	84	156	230	302	388	-
Paroxetine	66	58	54	55	47	53	53	58	49	-26.1

S Suppressed due to low (<6 observations) count.
*% Change refers to the percentage change in dispensing rates from 2007/08 until 2015/16.
Percentage changes are not calculated if either the 07/08 or 15/16 value is suppressed or missing.
Due to low numbers Trimipramine, Mianserin, Maprotiline, Tranylcypromine and Phenelzine are not presented.

age groups; 81% (from 71 per 100,000 in 2007/08) and 102% (from 1,001 per 100,000) for 1–12s and 13–17s respectively compared to 26% for 18–24s. Rates of TCA dispensings declined 46% (from 77 per 100,000) for 1–12s but increased 28% (from 410 per 100,000) and 25% (from 1,176 per 100,000) for the older age groups. SNRI rates nearly tripled over the study period for 13–17s up 178% (from 26 per 100,000) and for 18–24s up 183% (from 261 per 100,000) but remained constant at near zero for 1–12s.

Fluoxetine was dispensed at the highest rate within the 1–12 age group (Table 3) and almost doubled from 51 to 89 per 100,000 during the study period. Amitriptyline dispensing was the second highest at 29 per 100,000 in 2015/16 but decreased (-26%) over the time period. Sertraline and Citalopram were next at 19 and 18 per 100,000 in 2015/16 respectively. Sertraline and Escitalopram both came into funded use during the study period and by 2015/16 had experienced large uptakes in use. Dispensing rates for Imipramine and Nortriptyline declined over the study period.

For 13–17-year olds (Table 4), Fluoxetine again had the highest rate of dispensing at 1,287 per 100,000 in 2015/16, nearly double that of 07/08 and more than three times greater than any other antidepressant. Sertraline, Amitriptyline, Escitalopram and Citalopram (in that order) were the four other drugs dispensed at greater than 200 per 100,000 in 2015/16. The use of Sertraline and Escitalopram increased rapidly since they were introduced in 2010/11. Of antidepressants dispensed over the entire study period Venlafaxine increased the most, up 168% (from 26 per 100,000) and in 2015/16 was the seventh most dispensed drug within this age group.

For 18–24-year olds (see Table 5) Fluoxetine remained the drug with the highest dispensing rate (1,990 per 100,000 in 2015/16); however, unlike the younger age groups, rates stayed largely constant over the study period. Citalopram was the second most dispensed drug, but declined in use over time (down 30% to 1,274 per 100,000). Escitalopram and Sertraline were the third and fourth most dispensed drugs within this

Table 5: Annual dispensing rates (per 100,000 population) by drug for 18–24 age group.

	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	%Change*
Amitriptyline	668	713	729	730	781	823	852	865	874	30.8
Citalopram	1,822	2,069	2,361	2,440	2,363	2,202	2,059	2,004	1,274	-30.1
Clomipramine	20	29	26	24	30	31	28	20	26	31.6
Dosuleprin	86	79	71	60	53	42	38	33	35	-58.8
Doxepin	80	72	67	56	56	53	45	35	35	-55.9
Imipramine	22	25	21	21	18	17	12	7	8	-65.2%
Nortriptyline	333	369	418	451	491	509	527	561	544	63.4%
Fluoxetine	1,992	1,902	1,950	1,913	1,884	1,943	1,880	1,892	1,990	-0.1%
Moclobemide	31	29	30	30	32	28	21	25	6	-79.1%
Venlafaxine	262	313	353	371	416	438	538	647	740	182.9%
Mirtazapine	S	S	27	81	110	114	123	134	68	-
Escitalopram	S	S	S	74	281	525	675	869	1,096	-
Sertraline	S	S	S	75	224	403	561	730	951	-
Paroxetine	690	632	603	548	482	459	412	385	381	-44.8%

S Suppressed due to low (<6 observations) count.
*% Change refers to the percentage change in dispensing rates from 2007/08 until 2015/16.
Percentage changes are not calculated if either the 07/08 or 15/16 value is suppressed or missing.
Due to low numbers Trimipramine, Mianserin, Maprotiline, Tranylcypromine and Phenelzine are not presented.

Figure 2: Dispensing rates by ethnic group, 07/08 to 15/16.

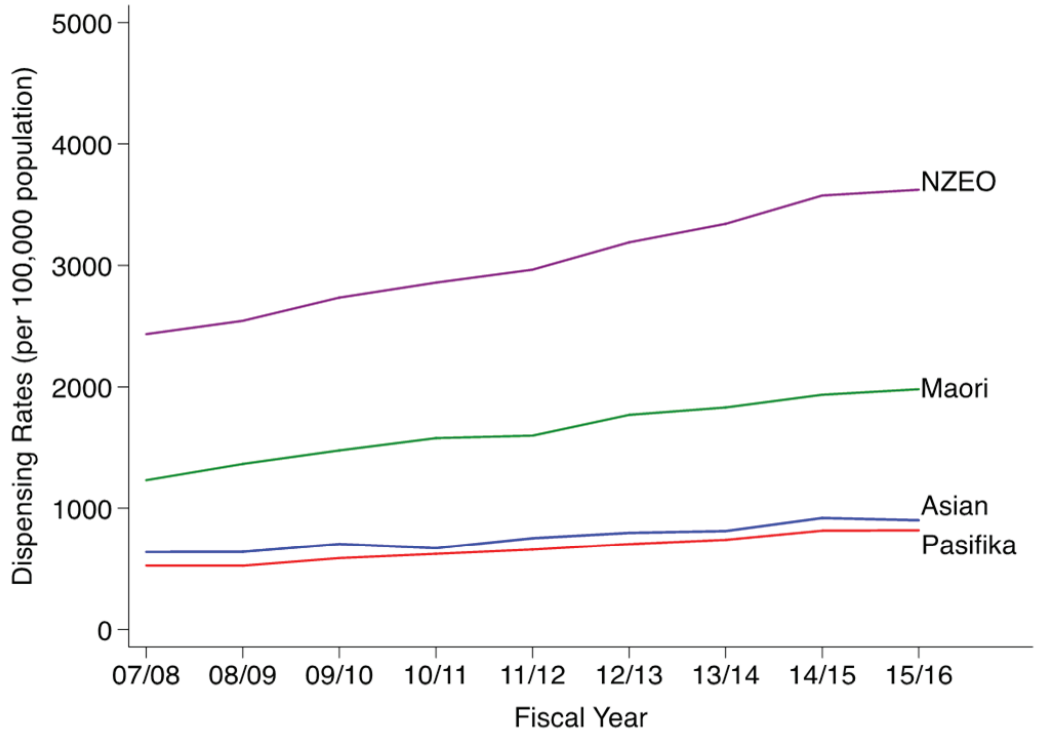
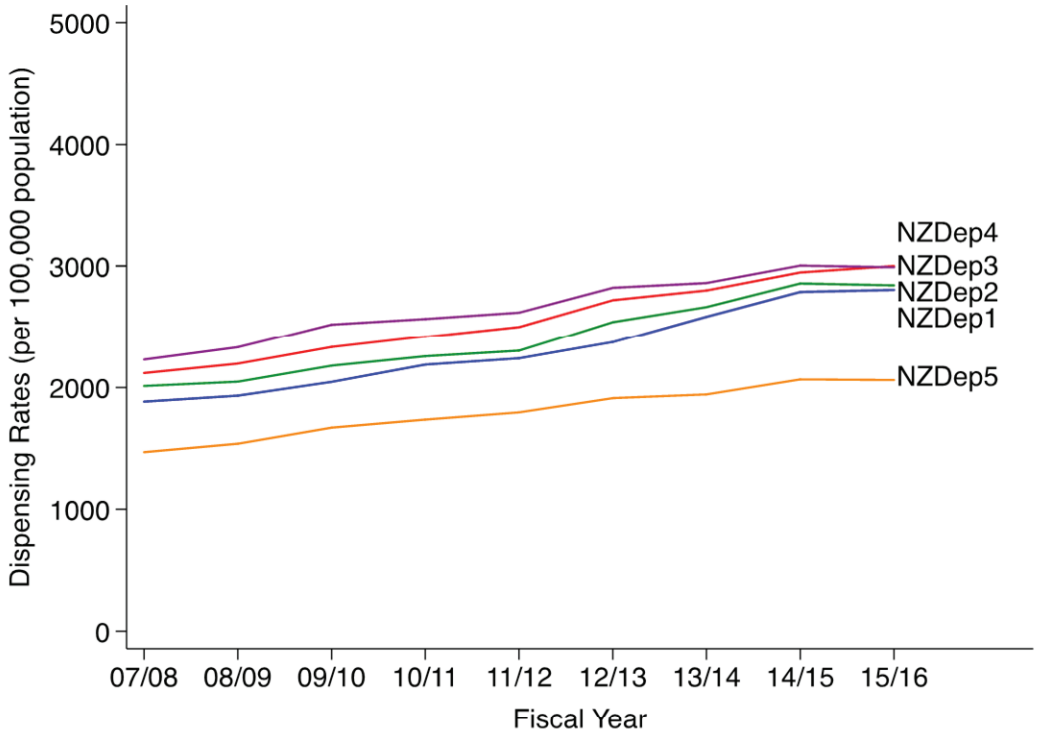


Figure 3: Dispensing rates by nzdep quintile, 07/08 to 15/16.



age group and dispensing increased rapidly following their entry into the market. Venlafaxine dispensing rates increased nearly threefold between 2007/08 and 2015/16 from 262 to 740 per 100,000.

Dispensing by ethnicity and socioeconomic status

Dispensing rates vary by ethnic group (Figure 2). The New Zealand European/Other (NZEO) ethnic group had the highest dispensing rates, with 3,623 per 100,000 receiving an antidepressant dispensing in 2015/16. Māori had the next highest rates, with 1,980 per 100,000 receiving an antidepressant in 2015/16. Rates for Asian (902 per 100,000) and Pasifika (819 per 100,000) were lowest. Rates for all ethnic groups increased over the period from 2007/08 to 2015/16, but the increase was steeper for Māori than for the other groups.

Antidepressant dispensing rates also varied by socioeconomic status (see Figure 3). For children and young people from NZDep quintiles 1 to 4, annual antidepressant dispensing rates typically increased slightly as deprivation increased. However, dispensing rates for the most deprived quintile (quintile 5) were lower than for all other quintiles (27% lower than quintile 1 in 2015/16). Dispensing rates for all quintiles increased over the nine-year study period, but increases tended to be smaller as deprivation increased.

Discussion

This study demonstrates for the first time that IDI data can be used to measure and track national rates of dispensed medication. During the nine-year period of this study, the total number of annual antidepressant prescriptions dispensed to children and young people increased by 68% from 111,171 in 2007/08 to 186,396 in 2015/16 and the rate of prescribing increased by 44% from 1,870 per 100,000 to 2,694 per 100,000. These increases occurred for both sexes and across all age groups. However, there was some notable variation in prescribing by ethnicity and socioeconomic status.

Upward trends in the total number and rates of dispensed antidepressants are consistent with, although on the upper end of, estimates from previous studies of antidepressant dispensing to children

and young people.[6,8,9] However, the rates at which different medications and medication classes are being dispensed have changed over time and patterns vary by age group. For example, rates of dispensing of SSRIs, especially Fluoxetine, have increased particularly in those aged 13–17 years, the use of TCAs has decreased in the youngest age group and increased in adolescents and young adults, and rates of SNRI prescribing have increased by 178% in the 13–17 age group (from 26 per 100,000 in 2007/08) and 183% (from 261 per 100,000) in the 18–24 age group. These variations may reflect changes to the pharmaceutical schedule, including availability of specific medications, medication subsidies and supply restrictions as well as evolution of evidence, including condition-specific treatment guidelines. Although reported dispensing rates encompass both primary and specialist service prescription, it should also be noted that access to specialist mental health services (funded to address the top 3% of mental health conditions) has improved from 1.3% to 2.9% during the period of investigation.[24] It may be that increased dispensing reflects improved access, and patterns of dispensing may suggest better mental healthcare. However, without linkage to diagnostic information, it is not possible to be certain.

The most likely mental health disorders to be treated with antidepressant medication are anxiety and depressive disorders. The prevalence and nature of these disorders vary with age.[25] Anxiety disorders are particularly developmentally linked in presentation. Children are more likely to experience separation anxiety disorder and generalised anxiety disorder, while young people are more likely to develop social phobia and panic disorder. Fluctuation occurs in the prevalence of individual anxiety disorders, with some reducing and other increasing with age. The 2016/17 New Zealand Health Survey estimates 3.0% of parents of children aged 2–14 have been told by a doctor their child has an anxiety disorder.[26] At 15 years of age, between 10.7% and 12.8% of young people have a diagnosable anxiety disorder.[27] In contrast, rates of depressive disorder increase significantly during adolescence from 2% at 11 years of age[28,29] to 4.2% by 15 years of age[27] and between 16–18% by adulthood.[27,30–34] Treatment guidelines for both anxiety and depressive disorders recommend the use of non-pharmacologic strategies ahead of medication except in cases of severe illness or when other measures have not been successful. Antidepressant medications, especially SSRIs have been shown to be modestly beneficial for the treatment of anxiety[16,35,36] and depression[14,16] in children and young people. On the other hand, TCAs are contraindicated for adolescent depression due to lack of effectiveness and lethality with overdose[37] and there is limited evidence for SNRI use in young people.[38] Our data indicate that SSRIs are the most likely antidepressant medication to be dispensed to children, that TCA prescribing has reduced over time and that SNRIs are only being prescribed to a small number of adolescents. Therefore, our findings are concordant with contemporary clinical expectation.

There was striking variation in dispensing rates by ethnicity. Children and young people of New Zealand European/Other ethnicities had the highest rates of antidepressant dispensing, followed by those of Māori, Asian and Pasifika origin. Our findings update, extend and echo those by Exeter et al, who found that dispensing rates to New Zealanders aged 15–100 years were higher for NZEO groups, compared with Māori and Pasifika youth. In our study, annual dispensing rates to NZEO were consistently over 80% higher than for Māori and over four times higher than for Pasifika. Māori children and young people make up 25% of New Zealand's 0–19 years population and nearly half (43%) of Māori people are aged between 0 and 19 years. Similarly, Pasifika infants, children and young people make up 10% of New Zealand's 0–19 years population and 39% of Pasifika people are aged between 0 and 19 years. Both Māori and Pasifika people experience greater rates of mental health disorder and clinical need.[26,33] Despite previous studies of adults in general practice showing lower rates of service access for Māori and Pasifika compared with those of NZEO ethnicities,[39] recent analysis highlights that things are different for children and young people accessing specialist mental health services. Māori children and young people access these services at a rate of

3.7% and constitute the highest proportion (32%) of clients. Approximately 1.8% of Pasifika children and young people access these services and make up 6% of the total number of clients. Asian children and young people make up 13% of New Zealand's 0–19 years population and access mental health services at a rate of 0.8%.[24] Identified differences in antidepressant dispensing rates do not correlate with either the proportion of people from different ethnicity or rates of service access to tertiary mental health services, where these medications are typically initiated. So, it is likely that other factors including the cost of medication,[40] health literacy,[41] medical practitioners bringing a scientific view only to consultations (ie, lacking cultural awareness and understanding),[42] and culturally mediated beliefs about treatment[43] are responsible for these differences. This issue requires further scrutiny if dispensing-related health disparities are to be reduced.

Differences in antidepressant dispensing by socioeconomic status may be explained by two groups of factors. The first, which probably underpins the increase in dispensing from the 1st to the 4th quintile, is the increased likelihood of mental health problems with increasing deprivation and associated adversity.[26,44,45] The second, which may explain the reduction in dispensing to those in the 5th quintile, includes lower rates of parental education,[46] a multitude of barriers to service access and affordability of treatment[40] for families in this subgroup.

The use of IDI data for analysing health trends is a relatively new venture which generates as many ethical questions as it does solutions. As larger amounts of data become available in an exponentially increasing manner (2.5 exabytes of 'big data' were generated internationally per day in 2016, with 90% of all available data being generated in the previous two years[47]), it appears wasteful not to use nationally available information to improve transparency about health issues, to assist in reducing inequities, and to track the outcomes of service changes and novel interventions. However, such increased analytical power needs to be balanced with the right to privacy for individuals, issues of data ownership in life and death, the veracity and completeness of available information, mechanisms for managing unexpected findings and agreed limits to the usage of data.[48] Mechanisms for the effective use of open data have been proposed by Gurstein[49] and others. These centre on trust, clarity of data ownership and the balance of rights between data owner and data exploiter.

To date, in New Zealand, discussions regarding the use of IDI data have included balancing the public good with informed consent, concluding that the benefits of a greater understanding of key health and social phenomena outweighs the relatively small risk associated with sharing these data more widely. However, the reverse could be true for Māori and Pasifika communities. The continued comparison with other ethnic groups with no improvements is in itself a form of harm. As a result, there has been an ongoing dialogue with indigenous data sovereignty groups. The issue of Indigenous Data Sovereignty that states that data are subject to the laws of the nation from which it is collected (including Tribal nations) is one which continues to receive attention in New Zealand but is unresolved (Kukutai, 2006) and those advocating for Pasifika that these data be used to improve the circumstances for Māori and Pacific communities rather than simply characterising observed differences. Furthermore, Durie (2006) stated that "although universal measures can be applied to Māori as they can to other populations, there are also unique characteristics of Māori that require specific measurement".[50] Data on Māori and Pasifika dispensing rates have been used in this paper, however they are also being separately analysed and additional cultural measures are being applied.

Overall, this study provides preliminary evidence of how IDI data can be used in a positive way to examine health trends and disparities. It also highlights limitations with these data and where additional linked data would be useful. Further clarification is needed, not just of the issues raised by these data, but also of the mechanisms of future IDI data refinement and utilisation at a national level.

The major strength of this study is the use of a large national dataset to provide information regarding prescriptions to all New Zealand children and young people

over almost a decade. In addition, we were able to calculate accurate population denominators and access socioeconomic deprivation and ethnicity information that would not otherwise have been available. Limitations of this study include lack of information regarding diagnoses and clinical reasons for prescription, sequencing of antidepressant use, other treatments such as psychotherapy and outcomes of treatment. Without this information, it is difficult to accurately determine for which disorders antidepressant medications are being prescribed at different ages, whether this is in line with individual treatment guidelines and whether current prescribing is making a difference at an individual or population level. In addition, as the IDI only contains data on filled prescriptions, it may not be an accurate reflection of the total number of prescribed medications, nor will it fully reflect medication adherence. Finally, analysis of prescription by primary care and specialist services and geographical regions has not been separately evaluated, so variations in prescribing practice between clinicians from different types of service cannot be determined.

For the moment, clinicians and researchers need to be aware that there have been changes in antidepressant dispensing over time and that there are discrepancies in dispensing rates between children and young people of different ethnicities and socioeconomic groups. Further linkage of diagnostic and treatment datasets is necessary to meaningfully comment on the appropriateness of current prescriber practice and to examine in more detail inequalities and potential inequities such as access to care. Following this, interventions to address current disparities in dispensing should be developed and evaluated. The IDI should be seen as a valuable resource in undertaking such research extensions and evaluations. Future research of patterns of dispensing could include duration of treatment and dose across sociodemographic groups and over time which may shed light on some of the health disparities identified. Finally, the current study should be repeated in 5 to 10 years to examine future dispensing trends.

Conclusion

This study demonstrates that the IDI can be used to measure and track national rates of dispensed medication. Currently available data indicate that antidepressant prescribing to New Zealand children and young people has increased across all age, sex and ethnic groups between 2006/7 and 2015/16, with some discrepancies between people of different ethnicities and deprivation. With further linkage of IDI datasets and research, it may be possible to improve the concordance of prescribing practice with treatment guidelines for depression and other childhood disorders and to reduce existing inequalities in healthcare.

Competing interests:
Dr Bowden reports personal fees from Janssen Cilag Pty Ltd outside the submitted work and grants from University of Auckland via National Science Challenge MBIE grant.
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The results in this paper are not official statistics. They have been created for research purposes from the Integrated Data Infrastructure (IDI), managed by Statistics New Zealand. The opinions, findings, recommendations, and conclusions expressed in this paper are those of the author(s), not Statistics NZ.
Access to the anonymised data used in this study was provided by Statistics NZ under the security and confidentiality provisions of the Statistics Act 1975. Only people authorised by the Statistics Act 1975 are allowed to see data about a particular person, household, business, or organisation, and the results in this paper have been confidentialised to protect these groups from identification and to keep their data safe.
Careful consideration has been given to the privacy, security, and confidentiality issues associated with using administrative and survey data in the IDI. Further detail can be found in the Privacy impact assessment for the Integrated Data Infrastructure available from www.stats.govt.nz.

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