Social Policy Evaluation and Research Unit

superu

Patterns and dynamics of alcohol consumption during pregnancy in a recent New Zealand cohort of expectant mothers

AUGUST 2015

Growing Up in New Zealand

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The views reported in this paper are those of the authors and do not necessarily represent the views of Superu or the GUiNZ study investigators.

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Executive summary

Foetal alcohol exposure continues to present as a public health challenge. We are still developing a knowledge base of the scale of the issue. Relatively little is known about the women who drink alcohol while pregnant, how much they drink, and how their drinking behaviours change as the pregnancy progresses.

The Growing Up in New Zealand study interviewed 6,822 expectant mothers to obtain their personal information and experience during pregnancy. It included questions on the level of alcohol drinking before the women became aware that they were pregnant, during the first trimester, and after the first trimester. The data and the contextual information collected from these respondents have been analysed in this paper to shed light on these questions.

Most women stopped drinking when pregnant

Around seven in 10 women (71 percent) reported drinking alcohol at some level before being aware of their pregnancy. As the pregnancy progressed there was a significant and widespread reduction in the proportion of women who reported drinking and in the volume they drank. The proportion of women who reported drinking alcohol at any level quickly reduced to 23 percent in the first trimester after becoming aware of pregnancy, and to 13 percent after the first trimester. Women who reported drinking four or more drinks per week reduced from 29 percent before becoming aware of their pregnancy, to 7 percent in the first trimester, and to less than 1 percent after the first trimester.

Some women continued to drink while pregnant

Alcohol consumption during pregnancy was not confined to any one sub-group in the population. Instead, the group of women who reported drinking alcohol during pregnancy was very heterogeneous with respect to their socio-demographic make-up, and the group was further differentiated by the volume of alcohol consumption. Drinking four drinks or more a week during pregnancy was more common among younger women, Māori women, women with no secondary qualification, smokers, and women whose pregnancy was unplanned. On the other hand, older women, European women, and women from socio-economically advantaged backgrounds were more likely to drink but at lower levels.

Multivariate analysis reveals that the status of alcohol drinking prior to awareness of pregnancy was a strong predictor of whether a woman reported drinking any alcohol during pregnancy. Alcohol consumption was strongly associated with ethnicity after controlling for other factors. European and Māori women were more likely to drink before becoming aware of their pregnancy and during pregnancy. To a lesser extent, there was a relationship between smoking status and alcohol consumption during pregnancy.

There was a range of different patterns of drinking during pregnancy

This paper also presents a pathway analysis that puts together data at three points of pregnancy to create a history of alcohol consumption before awareness of and during pregnancy. This enables us to take a longitudinal view of how the drinking behaviours changed over the course of the pregnancy. Transitional probabilities are calculated to quantify the propensity of change in the drinking status.

Six dominant pathways are identified for the 71 percent of women who reported drinking alcohol before becoming aware of their pregnancy:

- 43 percent of respondents stopped drinking immediately after becoming aware of their pregnancy
- 5 percent continued at a lower volume of drinking before stopping
- 11 percent continued at the same volume of drinking before stopping
- 5 percent drifted in and out of drinking
- 5 percent were drinking four or more drinks a week and managed to reduce the volume of drinking initially but reversed back to a higher volume of drinking
- 2 percent stayed at a high volume of drinking throughout the pregnancy.

A profile using socio-demographic and behavioural factors is provided for each of the six pathways, as well as for the 29 percent who did not drink.

Implications for policy / public health

The contrasting socio-demographic profiles, combined with the diverging behavioural pathways, provide valuable insights for constructing public health messages and formulating approaches that better target pregnant women. For example, the public health message of not drinking alcohol if women are planning to get pregnant does not appear to be getting through.

On a more positive note, the analysis reveals the presence of a strong, across-the-board intention to reduce alcohol intake. The challenge for public health is how to help these women translate this good intention into successfully stopping drinking as early as possible during their pregnancy. For each of the different pathways identified in this report, different levels and types of support may be needed and the women may need to be encouraged to stop drinking at different stages of the pregnancy. Women who made changes slowly will need to be incentivised differently from those who made changes quickly. Women who drifted or regressed will need to be supported at the critical times to stop them from reverting back to drinking.

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Introduction

The idea that early life influences during pregnancy may affect the developing foetus while in the womb is not new and is deeply ingrained across cultures and beliefs. As unremarkable as it may seem, a mother's life-style choices can have positive and negative consequences for the life that is developing inside her womb. At no other time is a life more dependent on the mother. What happens in the womb can have effects lasting a lifetime.

Despite public health efforts alcohol consumption during pregnancy remains a known and persistent challenge (Ministry of Health 2010 & 2015). It is an established risk factor that is linked to adverse outcomes for foetal and child development (McLeod, Pullon, Cookson & Cornford 2002; Patra, Bakker, Irving, Jaddoe, Malini & Rehm 2011). One of the most severe end results of heavy maternal alcohol abuse is foetal alcohol syndrome (FAS). But even small amounts of alcohol consumption during pregnancy have been linked to cognitive and behavioural impairments. Social and moderate alcohol consumption during pregnancy is associated with: offspring having reduced growth and head circumference; increased rates of neurological abnormalities (including intellectual handicap and behavioural disturbance); malformations; prematurity; and miscarriages. The evidence suggests that there is no safe level of alcohol consumption while pregnant (Ministry of Health 2010). This prompts an unequivocal recommendation of zero alcohol intake during pregnancy from public health and regulatory bodies in New Zealand (Ministry of Health 2010) and in other countries.

Recent New Zealand studies have indicated that alcohol consumption has been increasing in the last decade, especially among women (Huckle, Pledger & Casswell 2011). New Zealand research on factors associated with alcohol consumption during pregnancy have found that maternal alcohol use was higher among some ethnic groups, and was associated with income and education levels and with behavioural patterns such as smoking and drug use (McLeod et al. 2002; Mallard, Connor & Houghton 2013).

More importantly, little is known about how the pattern of drinking changes during pregnancy and about the characteristics of those who continue to drink. In order to design effective public health campaigns and to inform the practice of those working with pregnant women, it is important to understand the factors that influence the decision to drink or abstain from alcohol, before and during pregnancy.

This paper seeks to address both the cross-sectional and temporal dimensions by studying data collected from a large sample of pregnant women. The paper describes the characteristics that distinguish those pregnant women who consumed alcohol during pregnancy from those who did not and that distinguish the different levels of drinking among those who did drink. The socio-demographic characteristics of these women, their behavioural patterns and variables pertaining to the pregnancy are examined. The paper then turns its attention to changes in the reported status of alcohol consumption at different points of pregnancy. The paper identifies the dominant decision pathways and examines the key characteristics of the women associated with each pathway.

02

Data and methodology

The Growing Up in New Zealand (GUiNZ) study is a longitudinal survey that is designed to follow over 6,800 children and their families after the prenatal period (Morton et al. 2010). GUiNZ provides an opportunity to fill the knowledge gaps with regard to alcohol consumption during pregnancy as well as to a vast range of multidisciplinary topics regarding child growth and development. The study is carried out by the University of Auckland's Centre for Longitudinal Research – He Ara ki Mua, with funding from central government agencies.

GUiNZ data were collected via a combination of computer-assisted face-to-face interviews (CAPI) and computer-assisted telephone interviews (CATI) in between CAPI waves, and supplemented with direct measurements of the child. The first wave of CAPI data collection was completed in June 2010. In the majority of cases this interview was completed during the last trimester of pregnancy, and the rest shortly after the birth of the child. An antenatal questionnaire was used for interviewing the mother. A separate questionnaire was used for interviewing the partner of the mother, if the partner was also participating in GUiNZ. A total sample of 6,822 mothers was achieved, generating a cohort of 6,853 infants born during 2009 and 2010 (Morton et al. 2013).

Subsequent CAPI data collection waves were carried out when the children were nine months of age, and again at two years of age. A fourth CAPI wave at four and a half years was recently completed. In addition, six CATI waves of telephone interviews of the mothers were conducted when the children were six weeks, 35 weeks, 16 months, 23 months, 31 months, and 45 months of age; and two direct measurements of the children were carried out at perinatal and at two years of age.

A subset of the GUiNZ data made up of the earlier CAPI waves was made available in external working datasets to researchers external to the Auckland University GUiNZ project team. See the following website for details of GUiNZ data and access: www.growingup.co.nz/en/access-to-guinz-data.html

For the purpose of this paper, data were drawn from the external working datasets, based on responses from the mothers at the antenatal CAPI wave. The dataset contains information on patterns of alcohol consumption during pregnancy and up to nine months postpartum, as well as on an extensive range of other personal characteristics and behavioural measures.

The question on alcohol consumption during pregnancy was as follows:

"Now, thinking just about alcohol, and thinking about before you were pregnant, and during your pregnancy.

On average how many drinks of alcohol – beer, wine, spirits ...

1. Did you drink per week before becoming pregnant or before you were aware you were pregnant
2. Did you drink per week in the first 3 months of pregnancy
3. Did you drink per week after the first 3 months of pregnancy"

The following possible responses were listed on a showcard: "I did not drink alcohol", "Less than 1 drink per week", "1 drink per week", "2 drinks per week", "3 drinks per week", "4–6 drinks per week", "7–9 drinks per week", "10–14 drinks per week", "15–19 drinks per week", "20–39 drinks per week", "40 or more drinks per week".

In the external working datasets the raw data were collapsed into five response categories: Did not drink; Less than 1 drink; 1–3 drinks; 4–19 drinks; 20+ drinks. In this paper the two highest categories of alcohol consumption (4–19 drinks; 20+ drinks) were combined into a single category "4 or more drinks per week" to represent women who reported four or more drinks per week. Appendix Table A1 presents the results for the two sub-categories. The number of women reporting drinking 20 or more drinks a week was too small to support finer analysis of this group, particularly in the later stage of their pregnancy.

Since interviews were conducted in either the last trimester of the pregnancy or shortly after childbirth, the data collected reflect respondents' recall of alcohol consumption over three successive recall periods during pregnancy. Data from each of these recall periods enable detailed scrutiny of the patterns of alcohol consumption and of the relationships between alcohol consumption during pregnancy and other contextual factors.

The three data points can be connected to construct a longitudinal series that assembles a history of alcohol consumption before awareness of and during pregnancy. In doing so it adds a temporal dimension to the cross-sectional patterns and provides useful insights into the dynamics of alcohol consumption behaviour throughout the pregnancy.

There are a few issues regarding the cognitive construction and phrasing of the question that may affect the interpretation of the data. The question as reproduced above was not sufficiently specific on the starting point of the recall period or what constituted "before becoming pregnant". The phrase could have been taken to mean a time period that was:

- completely unrelated to the current pregnancy, or
- any time up to becoming aware of the pregnancy, which could include the period when a woman was trying to conceive and since the start of the pregnancy.

The confusion in the interpretation of the question could be reinforced by the use of "or" in "before becoming pregnant or before you were aware you were pregnant", which could have implied that the two events were mutually exclusive. Alcohol consumption was likely to vary between the two different time periods identified above, as was the potential impact of drinking alcohol on the pregnant woman. Therefore, caution is required when interpreting the level of drinking before awareness of pregnancy.

The time period between conception and "before you were aware you were pregnant" was part of the "first 3 months of pregnancy". In other words, the first two recall periods overlapped. On the other hand, respondents were likely to have differentiated conceptually the two periods as relating to *before awareness of pregnancy* and *since awareness of pregnancy but inside the first 3 months* and responded accordingly. This assumption seems to be borne out by the data (see Figure 1).

The majority of data were collected in the middle of the third recall period. It is assumed for all respondents, who completed the antenatal interview during the last trimester, that their experience of alcohol consumption from the beginning of the second trimester to the time of interview was representative of the rest of their pregnancy.

For simplicity, in the context of this paper the three data points were re-constructed and analysed in accordance with three non-overlapping periods: *since conception but before awareness of pregnancy*; *since awareness of pregnancy but within the first trimester*; and *after the first trimester*. Caution is recommended in interpreting the data regarding the first period, *since conception but before awareness of pregnancy*, for reasons explained above.

The partner of the mother who participated in GUiNZ was also asked about changes in the partner's alcohol consumption during the mother's pregnancy, but the data were not suitable to be included as part of this analysis.[1]

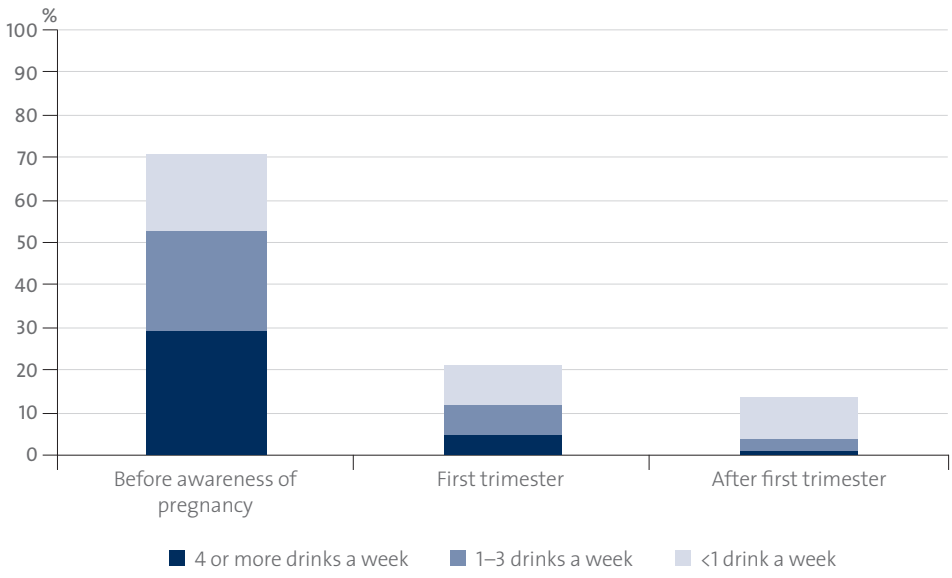
1 The single question relating to the partner's alcohol consumption was specifically constructed to ask about any change in the partner's alcohol consumption pattern during the woman's pregnancy, but without establishing the baseline before any changes. The question asked the partner to state "... how much alcohol you have been drinking, during your partner's pregnancy compared with before the pregnancy". Data generated from the response categories "I do not drink alcohol", "Much less", "A little less", "About the same", "A little more", and "A lot more" could not be meaningfully analysed without the knowledge of the prior position. Even the response "I do not drink alcohol" could have captured both those who always do not drink and those who stopped drinking during their partner's pregnancy. Accordingly, data on the partners' alcohol consumption were not included in this analysis.

03

Results

Responses to the question on maternal alcohol consumption are summarised in Figure 1. The size of each bar represents the proportion of women who reported drinking any alcohol prior to awareness of pregnancy, during their first trimester, and after the first trimester. The different shaded blocks within each bar represent the percentage of women who drank less than one drink per week (light blue), one to three drinks per week (medium blue), or four or more drinks per week (dark blue). The percentage of women who reported not drinking any alcohol are not included in Figure 1, but occupy the space between the top of each bar and 100%.

Figure 1 _ Percentage of women who reported the level of alcohol consumption at different stages of their pregnancy



There is a sharp contrast between the patterns of alcohol consumption before and after awareness of pregnancy. Around seven in 10 women (71 percent) reported drinking alcohol before becoming aware of their pregnancy. The proportion quickly reduced to 23 percent in the first trimester, and to 13 percent after the first trimester.

Prior to awareness of pregnancy, women were fairly evenly distributed in terms of their level of alcohol consumption. Among the 71 percent who reported drinking, around three in 10 women (29 percent) were drinking four or more drinks a week, around a quarter (24 percent) were drinking one to three drinks a week, and 18 percent reported drinking less than one drink a week.

The proportion of women who did not drink any alcohol prior to awareness of pregnancy (29 percent) was similar to the findings of the 2012/13 New Zealand Health Survey, which found that around a quarter (24 percent) of the female adult population aged 15 and over did not drink alcohol in the 12 months prior to the survey (Ministry of Health 2015).

In the first trimester after becoming aware of their pregnancy, more women chose to stop drinking or consumed less alcohol. More than three-quarters of women (77 percent) reported that they did not drink alcohol in the first trimester, which was more than double the percentage who did not drink prior to awareness of pregnancy. Percentages of women for all other levels of alcohol consumption during the first trimester were lower than before. However, there were still 7 percent of women who reported drinking four or more drinks per week during their first trimester while knowing they were pregnant.

In the second and third trimesters the percentage of women not drinking alcohol increased to 87 percent. Of the women who said they drank alcohol during the second and third trimesters, two-thirds consumed less than one drink per week and less than 1 percent of all pregnant women reporting drinking four or more drinks per week during those periods.

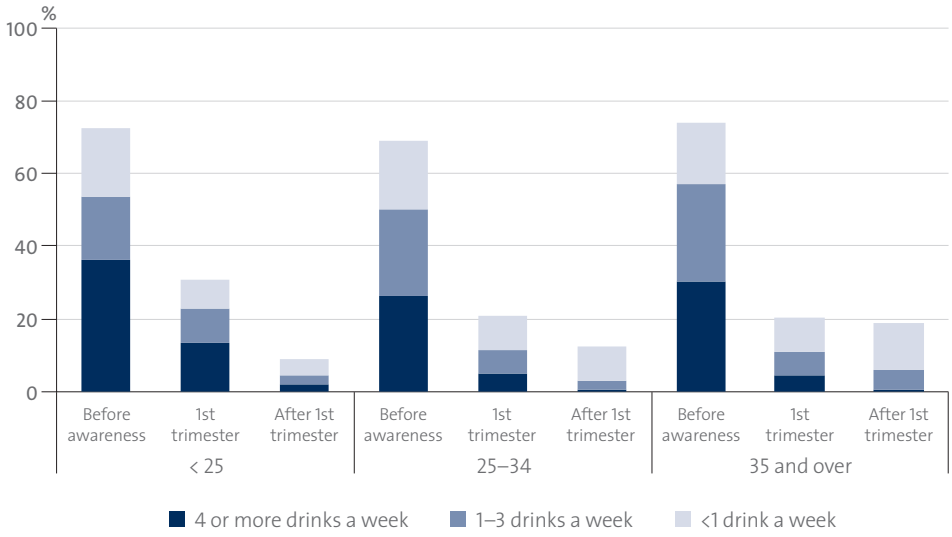
Overall, women reported that most of them stopped drinking once they were aware of their pregnancy. A minority continued to drink alcohol, but most of these women reduced their level of consumption as their pregnancy progressed. However, as will be shown later in the paper, for some women their drinking patterns while pregnant were much more varied and did not necessarily follow the overall continuous decline in consumption depicted in Figure 1.

3.1_ What factors were related to alcohol consumption during pregnancy?

The above overview shows that alcohol consumption was occurring among some women at different points during their pregnancy. This section uses the contextual information collected by GUiNZ to identify the personal characteristics and family settings that may relate to drinking during pregnancy. These factors include a person's socio-demographic status (eg their ethnicity and income level), their behavioural and personal predisposition towards alcohol drinking (eg smoking), and their particular pregnancy and pregnancy history (eg whether the pregnancy was planned).

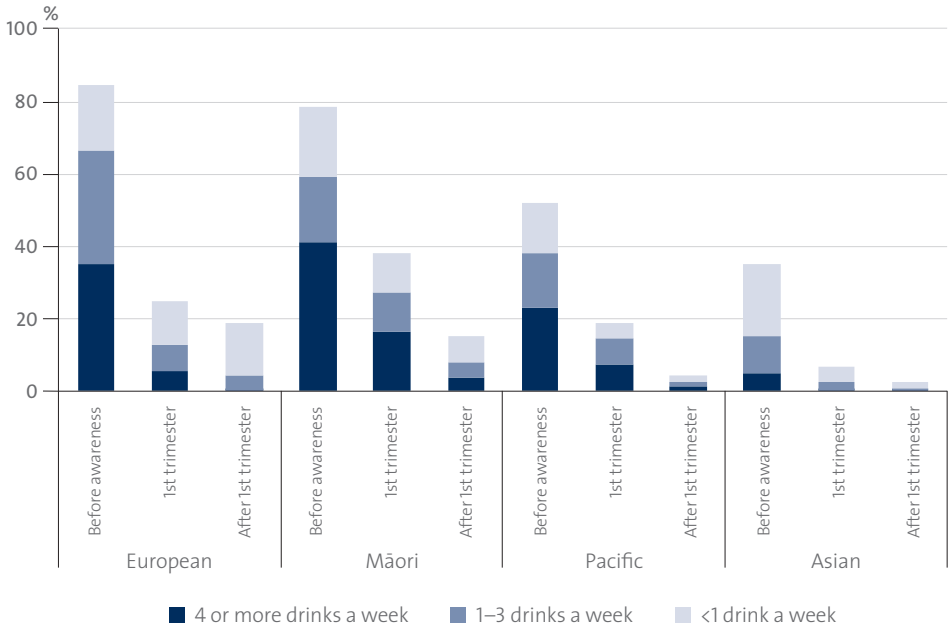
Figures 2 to 6 illustrate the results for some of the key contextual factors and their relationships with alcohol consumption at different stages of pregnancy. Descriptive statistics for a much wider selection of socio-demographic, behavioural and other pregnancy-related factors are provided in Appendix Tables A2a – A4c.

Figure 2 _ Percentage of women who reported the level of alcohol consumption at different stages of their pregnancy, by age group



Women in the younger age group were more likely than older women to drink four or more drinks per week at all stages of pregnancy. Nearly half (47 percent) of those aged below 20 years of age reported drinking four or more drinks a week prior to awareness of pregnancy. In contrast, the older age group tended to show a higher prevalence of lighter levels of drinking, particularly after the first trimester. The proportion of women who consumed some alcohol after the first trimester increased with age.

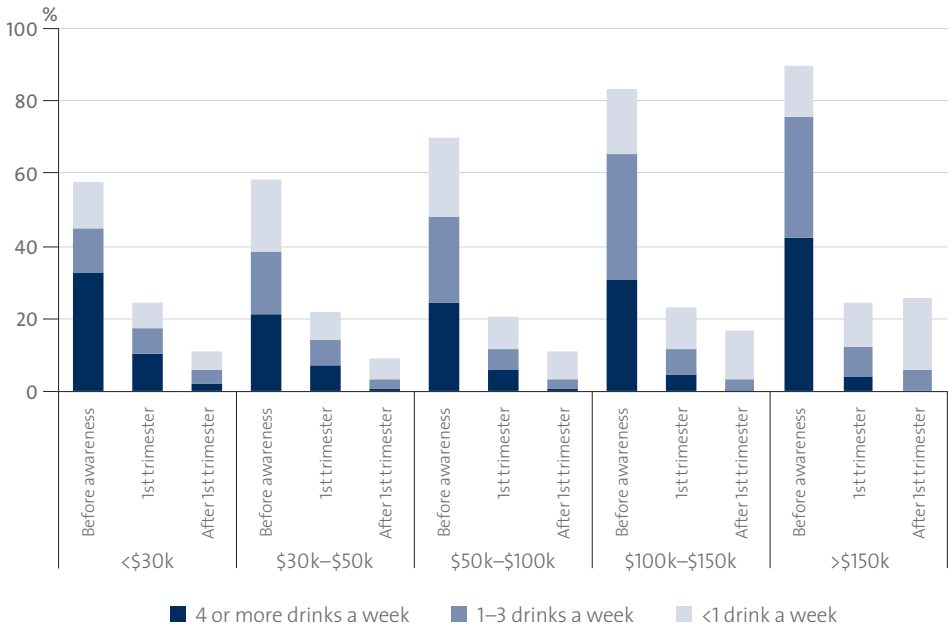
Figure 3 _ Percentage of women who reported the level of alcohol consumption at different stages of their pregnancy, by ethnicity



In this paper the analysis of ethnic data uses a self-prioritised ethnicity variable. Alcohol consumption was most common among European and Māori women. About a third of European women (31 percent) reported drinking between one and three drinks a week prior to awareness of pregnancy, and another third (35 percent) reported drinking four or more drinks a week. Past the point of awareness, European women showed a significant reduction in the proportion who drank alcohol in the first trimester. The momentum of reduction did not carry over into the second and third trimesters for European women, although those who continued to drink did reduce the amount they were drinking.

Māori women were more likely to drink at higher levels than women in other ethnic groups. Over four in 10 (41 percent) of Māori women reported drinking four or more drinks a week prior to awareness of pregnancy. They also showed the slowest reduction between awareness of pregnancy and in the first trimester.

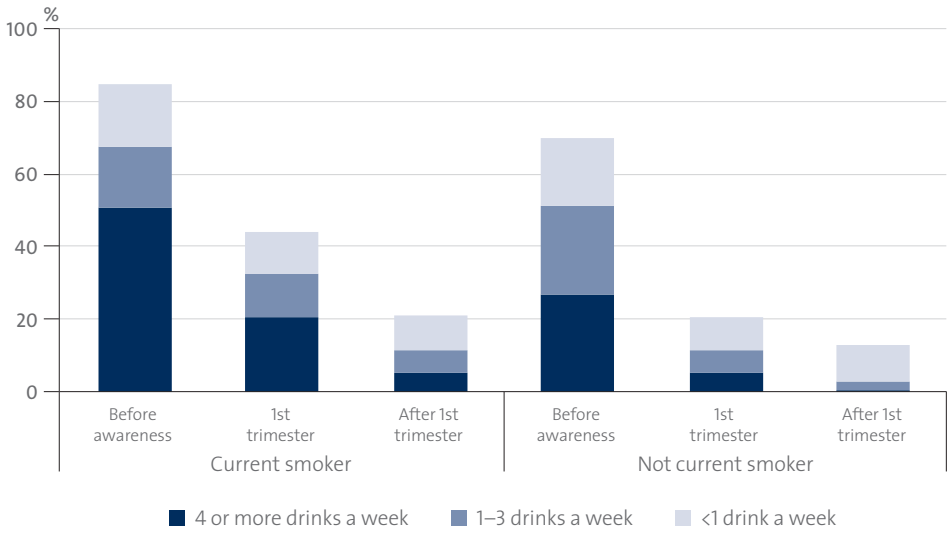
Figure 4 _ Percentage of women who reported the level of alcohol consumption at different stages of their pregnancy, by household income



Prior to awareness of pregnancy, the proportion of women who reported drinking any alcohol (the total size of each bar) increased with household income. Women with low household income (less than $30,000) and women with high household income (more than $100,000) were more likely to drink four or more drinks per week (dark blue) before they were aware of their pregnancy.

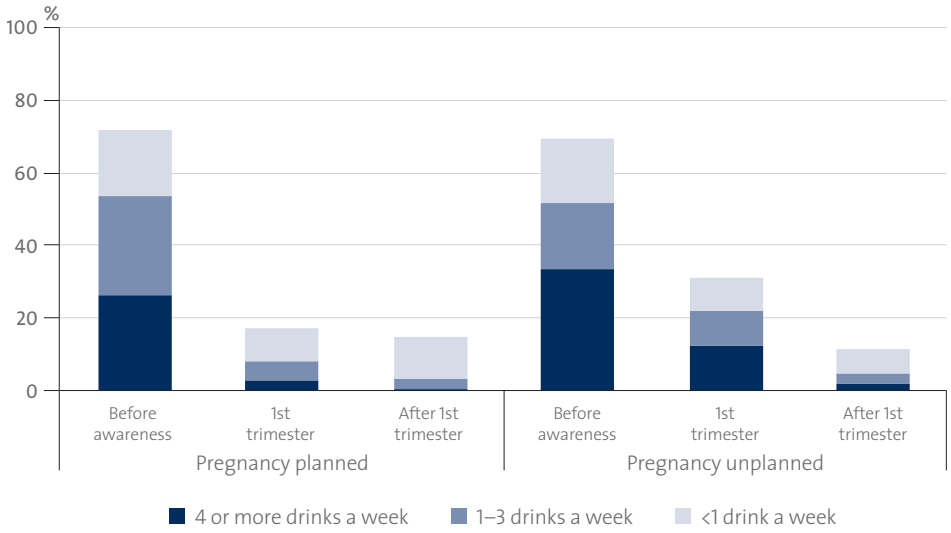
After becoming aware of pregnancy only women with low household income were more likely to drink four or more drinks a week. However, among women with a high household income, there was a relatively high and increasing proportion of lighter drinkers. This was particularly so among women from the highest household income category (more than $150,000), where the overall proportion of women drinking alcohol increased between the first trimester (14 percent) and the second and third trimesters (16 percent).

Figure 5 _ Percentage of women who reported the level of alcohol consumption at different stages of their pregnancy, by current smoking status



Not surprisingly, smoking status appeared to be an important risk factor for alcohol consumption during pregnancy. Prior to awareness of pregnancy, half (51 percent) of the women who smoked also reported drinking four or more drinks a week, which was nearly double the corresponding proportion for non-smokers (27 percent). Smokers were more likely to drink alcohol during their pregnancy. One in five smokers (21 percent) reported continuing to drink four or more drinks a week in the first trimester.

Figure 6 _ Percentage of women who reported the level of alcohol consumption at different stages of their pregnancy, by whether the pregnancy was planned or unplanned



The percentage of women who drank alcohol before they were aware they were pregnant was about the same whether they planned their pregnancy (72 percent) or not (69 percent). However, there was some evidence to suggest that women who planned their pregnancy drank less than women who did not plan their pregnancy (see also Morton et al. 2010). Among women whose pregnancy was not planned, there was a significantly higher proportion who reported drinking four or more drinks a week.

In summary, alcohol consumption during pregnancy was not confined to any one group of women. Instead, the respondents who drank alcohol while pregnant were a heterogeneous group, particularly in relation to socio-demographic characteristics. The group was further differentiated by the volume of alcohol consumption. Drinking four or more drinks per week prior to becoming aware of pregnancy was more prevalent among the young, women without secondary qualifications, women from the highest household income category, Māori women, smokers, women whose pregnancy was unplanned, and women giving birth for the first time. On the other hand, higher levels of drinking prior to awareness of pregnancy tended to be more common among older women and among women with higher household income or from socio-economically advantaged backgrounds.

Since becoming aware of pregnancy, the prevalence of alcohol consumption significantly reduced across all the characteristics considered above. Drinking four drinks or more per week when pregnant was more likely among women who were socio-economically *disadvantaged*. However, the opposite was true for pregnant women who drank at lighter levels – the proportion who reported drinking three or fewer drinks per week increased among those who were socio-economically *advantaged*. In fact, women from more advantaged groups and European women were more likely than other women to consume alcohol (on average less than one drink per week) during the second and third trimesters. This could reflect either an inability or reluctance to eliminate drinking alcohol, or a belief that an occasional drink is safe in pregnancy.

3.2_ How did each of the context factors relate to alcohol consumption at different stages of pregnancy after controlling for other factors?

Section 3.1 explores the relationship between alcohol consumption during pregnancy and each of the contextual factors in isolation in a univariate manner. However, these factors interacted heavily with one another, and the underlying relationships may look very different from a multivariate view. This section progresses the analysis to a multivariate statistical modelling, using the logistic regression technique to see how these factors interacted and to identify the properties of the underlying relationship between these factors and alcohol consumption at different stages of pregnancy.

Three logistic regression models are constructed for the three data points: before awareness of pregnancy, at first trimester, and after first trimester. For simplicity, the models measure any alcohol consumption against no alcohol consumption, without discriminating by the levels of consumption. The dependent or the outcome variable of *Alcohol Consumption Status* is constructed as a simple "yes/no" dichotomous indicator. The independent variables are presented in Table 1.

The construction of the logistic regression models followed an iterative process that continuously built on the insights gained through the modelling process. The socio-demographic variables included were: age; ethnicity; education; and household income. Slightly less than a quarter of the records have no response to the household income questions, and the non-response data were included in the model as a separate response category. The behavioural variables were: current smoker; other current smoker in the same room; and level of stress. An additional behavioural variable describing drinking status prior to awareness of pregnancy (by the five response categories in the original external dataset) was added to the second and the third models at first trimester and after first trimester respectively to enhance the descriptive power of these two models. The pregnancy history variables were whether the pregnancy was planned and whether this was the first birth for the women or a subsequent birth. The construction of the model included testing a number of other variables (eg NZDep), but those other variables were excluded because they did not show a significant relationship with alcohol consumption during pregnancy.

Part of the iterative modelling process also included testing the model fit by including and excluding first-order interactions. There was only a marginal difference in the goodness-of-fit. However, it is acknowledged that taking the simpler approach of not further differentiating by volume of consumption limits the analytical power of these models.

The results for the logistic regressions at prior to awareness of pregnancy (column 2), in the first trimester (column 3) and after the first trimester (column 4) in the form of odds ratios are presented in Table 1. Vertical comparisons are made with the reference group, which has an odds ratio of 1.00.

TABLE 01

Results of logistic regression of alcohol consumptions status at different stages of pregnancy

	Before awareness	First trimester	After first trimester
Alcohol consumption			
Did not drink		1.00	1.00
Less than 1 drink a week		18.98***	10.20***
1–3 drinks a week		37.72***	20.62***
4–19 drinks a week		61.17***	42.35***
20 or more drinks a week		90.39***	82.90***
Age			
<25	1.26*		0.56***
25–34	0.99		0.78**
35 and over	1.00		1.00
Ethnicity			
European	8.37***	1.36*	2.16**
Māori	5.58***	1.77**	1.65*
Pacific	1.99***	1.20	0.66
Asian	1.00	1.00	1.00
Highest qualification			
No secondary qualification		1.56**	0.85
Secondary/Dip/trade		1.07	0.80*
Bachelor degree or higher		1.00	1.00

Table 01 continues next page ...

	Before awareness	First trimester	After first trimester
Household income			
<$30k	1.00		1.00
$30k – $50k	1.05		1.06
$50k – $100k	1.45**		0.93
$100k – $150k	2.78***		1.15
>$150k	4.55***		1.68*
Non-response	1.29		1.02
Current smoker			
Yes	2.16***	1.36**	1.64***
No	1.00	1.00	1.00
Other current smoker in the same room			
Yes	1.71***		1.54**
No	1.00		1.00
Stress level			
High risk		0.69*	
Below high risk		1.00	
Planned pregnancy			
Yes		1.00	1.00
No		2.12***	0.88
Parity			
First-born	1.45***		0.71**
Subsequent birth	1.00		1.00

*** P<0.001; ** P<0.01; * P<0.05

Ethnicity was strongly associated with any alcohol consumption prior to awareness of pregnancy. Compared with Asian women, the odds for Pacific women drinking alcohol before being aware of pregnancy increased by two-fold. The odds for Māori women and European women were respectively, roughly five and a half times and eight and a half times those for Asian women. Household income was the other strong determinant, with increased risk of drinking as household income increases.

Current smoker, other current smoker in the same room, and whether the child was the first born or not (parity) demonstrated a significant relationship with consumption of alcohol prior to awareness of pregnancy. Women who responded positively to these variables were significantly more likely to drink alcohol than women who responded negatively.

In contrast, the age of the women had a much weaker relationship with any alcohol drinking prior to awareness of pregnancy. Not surprisingly, younger women aged less than 25 years were more likely to have consumed alcohol, but the odds were only 1.3 times those for women aged over 25 years.

As noted earlier, planning a pregnancy did not lower the probability of not drinking alcohol before becoming aware of the pregnancy.

The logistic regression models for whether women consumed alcohol in the first trimester and after the first trimester included drinking status prior to awareness of pregnancy as an explanatory variable. The introduction of prior alcohol drinking in these models had a very large impact on explaining drinking behaviour. Women who reported they consumed less than one drink per week, before they were aware they were pregnant, were nearly 20 times more likely to drink in the first three months of their pregnancy compared with women did not drink alcohol before awareness of pregnancy. For women who consumed four or more drinks per week prior to awareness of their pregnancy, the odds were 90 times greater.

These extremely large odds ratios were the combined effects of a strong underlying relationship that was then magnified by the minute portion of women (less than 0.5 percent) who started off not drinking at prior to awareness but moved on to some level of drinking later in their pregnancy. The odds ratios for prior drinking behaviour reduced when predicting whether women reported drinking any alcohol after the first trimester, but they were still between 10 and 80 times greater.

The other independent variables in these two models were overwhelmed by the effect of introducing the measure of prior drinking status. On the whole, in the first trimester the relationship between ethnicity and alcohol consumption became less acute. Instead, the effect of whether the pregnancy was planned or unplanned appeared as a stronger determinant. Compared to women who planned their current pregnancy, women whose pregnancy was not planned were more than twice as likely to drink during the first trimester. This finding may indicate that women who planned their pregnancy were more prepared to make lifestyle changes once they become pregnant.

After the first trimester a complex picture emerged. The direction of relationships with respect to age, qualification and parity had been reversed from the earlier models. Women were more likely to drink alcohol if they were older, European, better qualified, and have been pregnant before. Age, smoking status, and pregnancy history were the strongest determinants after prior drinking behaviour. The re-emergence of smoking status suggested the presence of a fatigue factor, where short-term change towards no drinking at first trimester could not be sustained for the rest of the pregnancy.

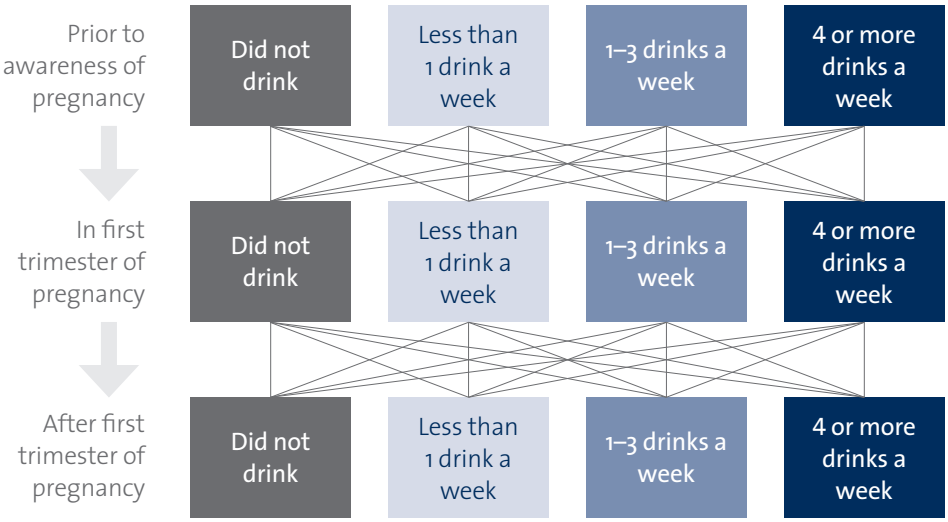
It is worth noting that the deprivation measure did not feature in any of the three main effects models. However, NZDep displayed a significant relationship with drinking in all three models when first-level interaction terms were added. Its underlying relationship with alcohol drinking was heavily moderated in the main effects model by the presence of other variables such as household income.

3.3_ What were the typical pathways of change in alcohol consumption throughout pregnancy?

The cross-sectional analysis in the previous sections highlights considerable change in drinking behaviour towards eliminating or lowering alcohol consumption. This section looks at how these changes occurred over the course of the pregnancy. Transitions are calculated between the three stages of pregnancy to identify the common pathways of change in drinking behaviour.

In keeping with the analysis in the early part of the paper, this section uses the four alcohol drinking statuses to calculate the transitional probabilities. Figure 7 illustrates all possible transitions. Each box represents an alcohol consumption status at each of the three pregnancy stages. Each arrow line denotes a theoretical path between stages within or across status.

Figure 7 _ All possible transitions in alcohol consumption status over the course of a pregnancy



A transition probability was calculated for each of the arrow lines. It is interpreted as the probability of moving to an alcohol consumption status at the next stage of pregnancy from a current alcohol consumption status. Table 2 contains the transition probabilities. Each vertical set of probabilities sums to 1.00. The upper panel calculates transition probability between before awareness of pregnancy and first trimester and the lower panel is between first trimester and after the first trimester.

TABLE 02

Transitional probabilities of alcohol consumption status between the three stages of pregnancy

		Prior to awareness of pregnancy			
		Did not drink	Less than 1 drink	1–3 drinks	4 or more drinks
In the first trimester	Did not drink	0.99	0.83	0.73	0.56
	Less than 1 drink	0.01	0.15	0.13	0.10
	1–3 drinks	0.00	0.01	0.13	0.12
	4 or more drinks	0.00	0.01	0.01	0.21

		In the first trimester			
		Did not drink	Less than 1 drink	1–3 drinks	4 or more drinks
After the first trimester	Did not drink	0.93	0.60	0.71	0.69
	Less than 1 drink	0.06	0.34	0.13	0.12
	1–3 drinks	0.01	0.06	0.15	0.09
	4 or more drinks	0.00	0.00	0.01	0.10

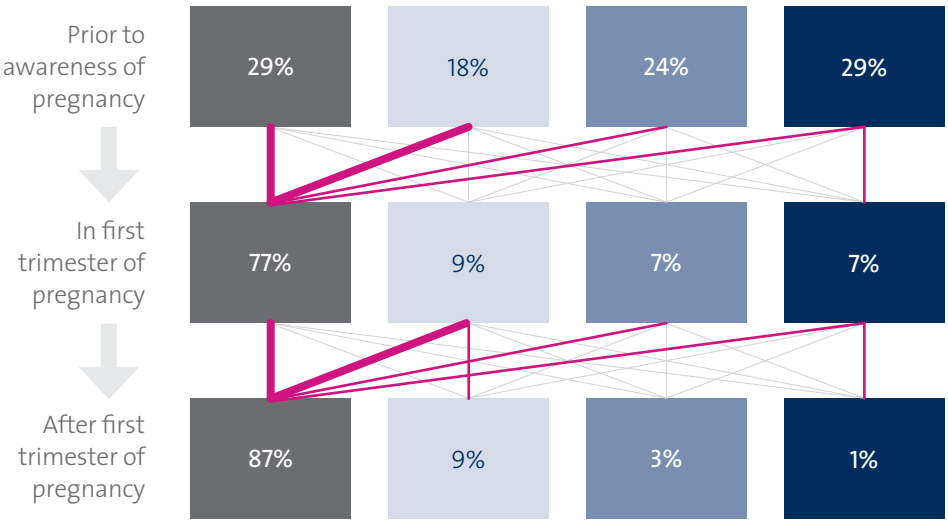
* The cell shade indicates the strength of probability

Between *prior to awareness of pregnancy* and *in the first trimester* almost everyone who did not drink at the outset stayed away from alcohol (transitional probability = 0.99). Similarly, the vast majority of women drinking less than one drink per week stopped drinking alcohol (transitional probability = 0.83). The transitions among women from drinking either one to three drinks per week or four or more drinks per week towards no drinking were also strong (0.73 and 0.56 respectively). The transitions between other alcohol drinking statuses were less intense but not insignificant (transitional probability > 0.10). Women who reported drinking four or more drinks per week had the highest probability of continuing to drink at the same level during the first trimester, at about one in five chances (transitional probability = 0.21). Since the four or more drinks per week category is open-ended, it is possible that some of these women who stayed in the heavy drinking category did reduce their alcohol consumption.

Between *in the first trimester* and *after the first trimester* the transition towards stopping drinking continued. The propensity for women who drank four or more drinks per week in the first trimester to stop drinking (transitional probability = 0.69) was greater than the corresponding transition probability between prior to awareness of pregnancy and the first trimester (transitional probability = 0.56). The level of persistence in alcohol consumption for this group halved to 0.10 between the first trimester and after the first trimester. However, there was an increase in persistence for women drinking less than one drink per week over the second transition period (transitional probability = 0.34). Transitioning in the opposite direction towards increased level of drinking also became evident among some light and mid-level drinkers.

Figure 8 provides a graphical view of the transition probabilities in Table 2 by overlaying the dominant transitions onto Figure 7. The width of each line indicates the relative strength of the transition probability. The percentage of women who report each status of alcohol consumption at each stage of pregnancy (as shown in Figure 1) is included to give a sense of the population size of the transition.

Figure 8 _ Main transitional pathways of alcohol consumption behaviour over the course of pregnancy



The main transitions (identified in Figure 8) in alcohol consumption behaviour over the course of the pregnancy are becoming clear. The mix of pathways can be summarised into seven categories, which are described in Table 3. These pathways represent over 99 percent of the sample. The remaining less than 1 percent of the pathways are relatively rare in the population.

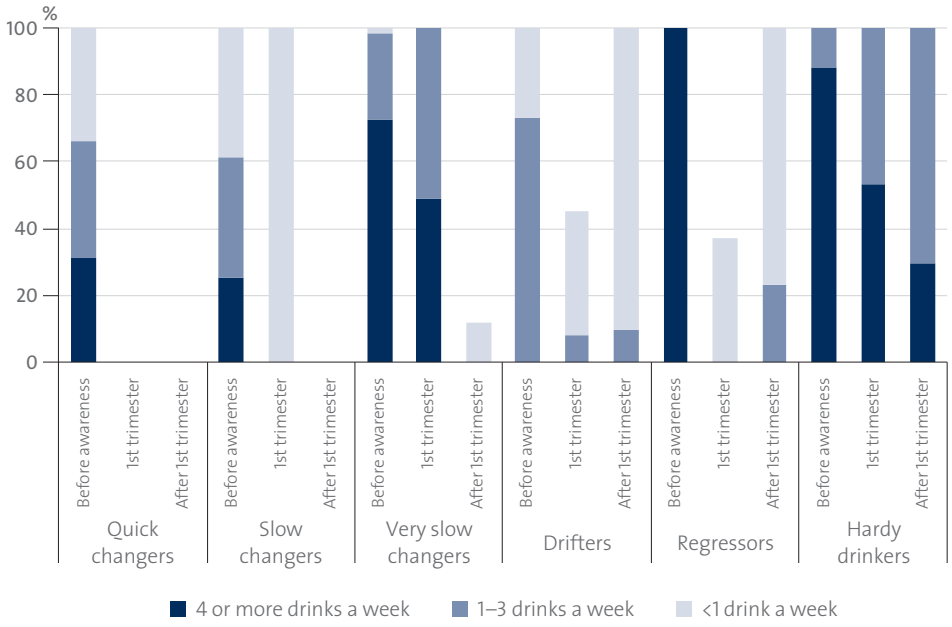
TABLE 03

Categories of pathway of changes in alcohol consumption behaviour throughout pregnancy

Pathway	% of sample	Personal characteristics – relative to the overall sample
Non-drinkers – Abstained from alcohol throughout the pregnancy	29%	Asian women, and to a lesser extent Pacific women, were significantly over-represented in this group. The women tended to be in their late twenties and socio-economically disadvantaged. Compared to the overall sample, a higher proportion were non-smokers and had given birth previously.
Quick changers – Drinkers of all levels who quickly stopped drinking in the first trimester and stayed off alcohol throughout	43%	This group was dominated by women who were European, better qualified and more socio-economically advantaged. The pregnancies were more likely to be planned. A relatively higher proportion had not been pregnant before.
Slow changers – Drinkers of all levels who moved to light drinking in the first trimester and stopped drinking after the first trimester	5%	European and Māori women were over-represented in this group. There was a slightly higher proportion of women at the upper end of the household income distribution and a relatively high proportion of current smokers. The pregnancies were more likely to be unplanned, and the women were more likely to be pregnant for the first time.
Very slow changers – Mostly mid-level or heavy drinkers who stayed at the same level of drinking in the first trimester before stopping drinking altogether after the first trimester	11%	The youngest age groups, particularly women under 20 years of age, and Māori women were significantly over-represented in this group. A significantly high proportion had no secondary school qualification and were living in the most socio-economically deprived areas. Compared to the overall sample, women in this group were nearly twice as likely to smoke. A significantly higher proportion of the pregnancies in this group were unplanned and a higher proportion of women were giving birth for the first time.
Drifters – Light or mid-level drinkers who drifted between no drinking, light drinking and mid-level drinking throughout the pregnancy	5%	This group was overwhelmingly dominated by European women and women in the older age groups. They tended to be significantly better qualified and in the upper household income categories. The proportions of planned pregnancies and women giving birth previously were much higher than in the overall sample.
Regressors – Heavy drinkers who either stopped or reduced to light drinking in the first trimester but regressed to a higher level of drinking after the first trimester	5%	This group of women was very similar in characteristics to the "Drifters" – older, European, and significantly socio-economically advantaged, and with a significantly higher proportion of unplanned pregnancies. A key difference was that, while the "Drifters" had a substantially higher proportion of first-time pregnancies, among the "Regressors" there was no difference from the overall sample in the proportion who were pregnant for the first time or giving birth for the first time.
Hardy drinkers – Predominately heavy drinkers who stayed at a high level of drinking throughout the pregnancy	2%	In this group there was significant over-representation from Māori women, women from both ends of the age range, and women from most socio-economically deprived areas. Compared to the overall sample, women in this group were more than three times as likely to have no secondary qualification, and nearly four times more likely to smoke. A significantly higher proportion of the pregnancies were unplanned and a higher proportion of women had given birth previously. The high proportion of subsequent births and an over-representation of older women set this group of women apart from the "Very slow changers".

The changes in alcohol consumption over the course of pregnancy for each of the latter six pathways in Table 3 are illustrated in Figure 9. The rapid elimination of drinking among "Quick changers" is denoted by the zero level of consumption by the first trimester data point. The shift among "Slow changers" and "Very slow changers" were in two waves: first, from high volume of drinking to low volume by the first trimester; and second, from drinking to stopping drinking completely by the time after the first trimester.

Figure 9 _ Changes for each main pathway in alcohol consumption over the course of pregnancy



The zig-zag pathways for the "Drifters" and "Regressors" were clearly visible, as was the shift towards consuming less alcohol. By contrast, among the "Hardy drinkers" there was no indication of stopping, but there was a shift towards drinking less.

04

Discussion

The GUiNZ study provides a rich data source for social science researchers and public policy practitioners. This paper examines information collected by GUiNZ on the patterns and dynamics of alcohol consumption before and during pregnancy.

The study shows that the vast majority of women have responded to the public health message of refraining from drinking alcohol during pregnancy. Around seven in 10 women (71 percent) reported drinking alcohol at some level before being aware of their pregnancy. As the pregnancy progressed there was a significant and widespread reduction in the proportion of women who reported drinking and in the volume they drank. The proportion of women who reported drinking alcohol at any level quickly reduced to 23 percent in the first trimester after becoming aware of pregnancy, and to 13 percent after the first trimester. Women who reported drinking four or more drinks per week reduced from 29 percent before becoming aware of their pregnancy, to 7 percent in the first trimester and less than 1 percent after the first trimester.

Among the women who drank during their pregnancy the pattern of alcohol consumption differed markedly across socio-demographic groups and other personal behavioural factors. In a univariate analysis, age, ethnicity, socio-economic status (which represents a range of variables), smoking status, whether the pregnancy was planned, and whether it was their first-born were factors that were found to correlate with alcohol consumption. The strength and the direction of the relationship varied considerably depending on the level of drinking and the stage of pregnancy.

However, the multivariate analysis reveals that the status of alcohol drinking prior to awareness of pregnancy was a strong predictor of whether a women reports drinking any alcohol during pregnancy. Alcohol consumption was strongly associated with ethnicity after controlling for other factors. To a lesser extent, there was a strong relationship between smoking status and alcohol consumption throughout pregnancy.

Our analysis also uncovers a complex dynamic concerning a comparatively small subset of women who reported continuing to drink alcohol during their pregnancy. Younger women, women from socio-economically disadvantaged backgrounds, women of Māori ethnicity, smokers, and women who reported an unplanned pregnancy were more likely to report drinking four or more drinks per week while pregnant. While some of these women slowly reduced the amount they drank and then stopped drinking alcohol altogether, some also continued to drink throughout the pregnancy.

Another group of women reported various levels of drinking throughout their pregnancy – on average this group were older and of European ethnicity, they were better educated and had a significantly higher household income, and their pregnancies were planned. About half of these women drifted between drinking no alcohol, drinking less than one drink per week, and drinking between one and three drinks per week during their pregnancy. The other half were heavier drinkers who minimised their drinking in the first trimester, but reverted back to higher levels of drinking after the first trimester.

The contrasting socio-demographic profiles, combined with the diverging behavioural pathways, provide valuable insights for constructing public health messages and formulating approaches that better target pregnant women. For example, the public health message of not drinking alcohol if women are planning to get pregnant does not appear to be getting through.

On a more positive note, the analysis reveals the presence of a strong, across-the-board intention to reduce alcohol intake, even among the "Hardy drinkers". The challenge for public health is how to help these women translate this good intention into successfully stopping drinking as early as possible during pregnancy. For each of the different pathways identified in this report, different levels and types of support may be needed and the women may need to be encouraged to stop drinking at different stages of the pregnancy. Women who made changes slowly will need to be incentivised differently from those who made changes quickly. Women who drifted or regressed will need to be supported at the critical times to stop them from reverting back to drinking.

There are a few limitations in the analysis. This analysis is based on self-reported data, and it is widely acknowledged that data collected by this methodology is likely to be biased to an underestimation of alcohol consumption. It is not possible to estimate the extent of any downward bias in the dataset. The respondents were also required to recall, with a considerable time lag, how much they were drinking, and this may have introduced recall error.

While future research may not easily overcome issues with self-reported data, there are opportunities to extend the current analysis of the data. Extending the logistic regression models so that they differentiate levels of drinking would enhance the descriptive power of the analysis.

As GUiNZ continues to follow these women and their children it will be possible to examine the relationship between drinking during pregnancy and child development.

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Appendix

TABLE A1

Percentage distribution of women reporting level of alcohol consumption during different stages of their pregnancy

	Prior to awareness of pregnancy (n=6,805)		During the first trimester (n=6,804)		After the first trimester (n=6,810)	
	%	S.D.	%	S.D.	%	S.D.
Did not drink	29.1	0.6	77.4	0.5	86.6	0.4
< 1 drink per week	18.2	0.5	9.0	0.3	9.3	0.4
1–3 drinks per week	23.5	0.5	6.9	0.3	3.2	0.2
4–19 drinks per week	26.9	0.5	5.9	0.3	0.7	0.1
20+ drinks per week	2.2	0.2	0.8	0.1	0.1	–

TABLE A2a

Patterns of alcohol consumption prior to becoming aware of their pregnancy, by socio-demographic characteristics

	Before becoming pregnant or before being aware of pregnancy				
		Did not drink	Less than 1 drink per week	1–3 drinks per week	4 or more drinks per week
	n =	%	%	%	%
Age					
<20	*328*	18.6	18.6	15.5	**47.3**
20–24	*997*	30.3	19.1	18.1	32.6
25–29	*1,664*	**36.1**	18.9	20.4	24.6
30–34	*2,117*	27.4	18.1	**27.0**	27.5
35–39	*1,416*	24.8	16.9	**27.3**	31.0
40 and over	*283*	31.4	17.3	25.8	25.4
Ethnicity					
European	*3,606*	15.2	18.4	**31.2**	**35.2**
Māori	*943*	21.2	19.4	18.0	**41.4**
Pacific	*999*	**47.9**	13.7	15.5	22.8
Asian	*1,003*	**64.6**	20.4	10.1	4.9
Highest qualification					
No secondary qual.	*489*	27.0	14.9	13.7	**44.4**
Secondary/NCEA 1–4	*1,625*	**35.0**	18.4	18.3	28.4
Dip/trade/NCEA 5-6	*2,077*	29.6	18.2	23.0	29.3
Bachelor's degree	*1,538*	27.0	20.2	**26.7**	26.1
Higher degree	*1,063*	23.3	16.7	**32.7**	27.2

	Before becoming pregnant or before being aware of pregnancy				
		Did not drink	Less than 1 drink per week	1–3 drinks per week	4 or more drinks per week
	n =	%	%	%	%
Household income					
<$30k	*512*	**42.6**	12.7	11.9	32.8
$30k – $50k	*738*	**42.0**	19.5	17.5	21.0
$50k – $70k	*860*	**36.9**	19.7	21.2	22.3
$70k – $100k	*1,198*	25.7	**22.6**	26.1	25.5
$100k – $150k	*1,155*	16.8	17.8	**34.3**	31.1
> $150k	*745*	10.2	14.6	**33.0**	**42.1**
NZDep2006					
Deciles 9 & 10	*1,879*	**37.8**	17.2	16.8	28.2
Deciles 7 & 8	*1,423*	**33.1**	18.6	20.4	28.0
Deciles 5 & 6	*1,168*	25.9	18.4	26.3	29.5
Deciles 3 & 4	*1,235*	22.8	18.3	**29.1**	29.9
Deciles 1 & 2	*1,098*	19.8	18.9	**30.1**	31.1

* Shaded cells indicate values significantly different from the corresponding population average. Values that are significantly above the population average are further denoted in bold.

TABLE A2b

Patterns of alcohol consumption prior to becoming aware of their pregnancy, by attitudinal and behavioural measures

	Before becoming pregnant or before being aware of pregnancy				
		Did not drink	Less than 1 drink per week	1–3 drinks per week	4 or more drinks per week
	n =	%	%	%	%
Women who identified alcohol to avoid in pregnancy					
	3,843	13.6	19.3	**30.3**	**36.8**
Current smoker					
Yes	*661*	15.4	17.2	16.6	**50.7**
No	*5,511*	30.0	18.7	24.8	26.5

	Before becoming pregnant or before being aware of pregnancy				
		Did not drink	Less than 1 drink per week	1–3 drinks per week	4 or more drinks per week
	n =	%	%	%	%
Moderate physical activity for longer than 10 minutes					
Inactive	*1,146*	**34.1**	20.7	19.3	25.9
1–3 days a week	*2,299*	24.6	18.3	**28.0**	29.1
4+ days a week	*2,717*	29.3	17.8	22.3	30.5
Stress level – Cohen Perceived Stress					
High (score > 23)	*1,061*	29.8	19.4	22.0	28.7
Below high	*5,042*	29.0	18.0	23.8	29.2
Depression – Edinburgh Postnatal Depression Scale					
High risk (score > 13)	*597*	28.3	18.4	26.5	26.8
Below high risk	*6,208*	29.2	18.2	23.3	29.4

* Shaded cells indicate values significantly different from the corresponding population average. Values that are significantly above the population average are further denoted in bold.

TABLE A2c

Patterns of alcohol consumption prior to becoming aware of their pregnancy, by measures pertaining to the pregnancy

	Before becoming pregnant or before being aware of pregnancy				
		Did not drink	Less than 1 drink per week	1–3 drinks per week	4 or more drinks per week
	n =	%	%	%	%
Planned pregnancy					
Yes	*4,089*	28.1	18.5	**27.2**	26.2
No	*2,695*	30.6	17.8	18.0	**33.6**
Have been pregnant before					
No	*2,057*	25.5	17.2	24.6	**32.7**
Yes	*4,747*	30.7	18.6	23.1	27.6
Parity					
First-born	*2,849*	24.7	16.3	24.3	**34.7**
Subsequent birth	*3,956*	**32.3**	19.6	23.0	25.2

* Shaded cells indicate values significantly different from the corresponding population average. Values that are significantly above the population average are further denoted in bold.

TABLE A3a

Patterns of alcohol consumption in the first 3 months of pregnancy, by socio-demographic characteristics

	In the first 3 months of pregnancy				
		Did not drink	Less than 1 drink per week	1–3 drinks per week	4 or more drinks per week
	n =	%	%	%	%
Age					
<20	*327*	58.7	11.3	**11.6**	**18.3**
20–24	*995*	72.7	7.0	8.1	**12.2**
25–29	*1,665*	79.8	8.1	6.2	5.9
30–34	*2,119*	78.9	9.9	6.6	4.6
35–39	*1,415*	79.6	9.6	6.4	4.3
40 and over	*283*	78.8	8.8	6.7	5.7
Ethnicity					
European	*3,602*	75.5	**11.5**	7.3	5.8
Māori	*948*	62.1	10.4	**10.8**	**16.7**
Pacific	*998*	**81.4**	4.2	6.8	7.6
Asian	*1,003*	**93.3**	4.1	2.2	0.4
Highest qualification					
No secondary qual.	*488*	61.9	8.6	**11.5**	**18.0**
Secondary/NCEA 1–4	*1,625*	76.9	8.4	7.5	7.2
Dip/trade/NCEA 5–6	*2,078*	77.1	8.3	6.4	8.1
Bachelor's degree	*1,537*	**81.3**	9.5	6.0	3.2
Higher degree	*1,063*	80.5	10.6	6.1	2.7
Household income					
<$30k	*511*	75.5	6.8	7.2	**10.4**
$30k – $50k	*738*	78.5	7.2	6.9	7.5
$50k – $70k	*860*	**81.6**	6.9	5.2	6.3
$70k – $100k	*1,197*	78.0	10.4	6.3	5.3
$100k – $150k	*1,156*	76.6	**11.7**	7.4	4.3
> $150k	*745*	75.7	11.9	8.2	4.2

	In the first 3 months of pregnancy				
		Did not drink	Less than 1 drink per week	1–3 drinks per week	4 or more drinks per week
	n =	%	%	%	%
NZDep2006					
Deciles 9 & 10	*1,883*	74.7	7.7	7.1	**10.5**
Deciles 7 & 8	*1,421*	77.9	8.6	6.8	6.8
Deciles 5 & 6	*1,168*	79.0	9.6	6.3	5.1
Deciles 3 & 4	*1,231*	78.2	9.2	8.3	4.3
Deciles 1 & 2	*1,099*	78.8	10.8	6.1	4.3

* Shaded cells indicate values significantly different from the corresponding population average. Values that are significantly above the population average are further denoted in bold.

TABLE A3b

Patterns of alcohol consumption in the first 3 months of pregnancy, by attitudinal and behavioural measures

	In the first 3 months of pregnancy				
		Did not drink	Less than 1 drink per week	1–3 drinks per week	4 or more drinks per week
	n =	%	%	%	%
Women who identified alcohol to avoid in pregnancy					
	3,839	73.7	10.5	8.5	7.2
Current smoker					
Yes	*661*	56.0	11.3	**12.1**	**20.6**
No	*5,510*	**79.5**	9.1	6.3	5.0
Moderate physical activity for longer than 10 minutes					
Inactive	*1,143*	76.6	9.6	7.5	6.2
1–3 days a week	*2,300*	77.5	9.8	7.2	5.5
4+ days a week	*2,718*	76.7	8.9	6.4	8.0
Stress level – Cohen Perceived Stress					
High (score > 23)	*1,061*	79.6	9.3	5.6	5.5
Below high	*5,042*	77.0	9.0	7.2	6.9
Depression – Edinburgh Postnatal Depression Scale					
High risk (score > 13)	*599*	80.1	7.8	5.7	6.3
Below high risk	*6,205*	77.1	9.1	7.1	6.7

* Shaded cells indicate values significantly different from the corresponding population average. Values that are significantly above the population average are further denoted in bold.

TABLE A3c

Patterns of alcohol consumption in the first 3 months of pregnancy, by measures pertaining to the pregnancy

	In the first 3 months of pregnancy				
		Did not drink	Less than 1 drink per week	1–3 drinks per week	4 or more drinks per week
	n =	%	%	%	%
Planned pregnancy					
Yes	*4,087*	**83.0**	8.8	5.4	2.8
No	*2,696*	69.0	9.2	**9.3**	**12.4**
Have been pregnant before					
No	*2,056*	75.9	9.8	7.0	7.4
Yes	*4,747*	78.1	8.7	6.9	6.3
Parity					
First-born	*2,846*	75.9	9.3	7.2	7.6
Subsequent birth	*3,958*	78.4	8.8	6.7	6.0

* Shaded cells indicate values significantly different from the corresponding population average. Values that are significantly above the population average are further denoted in bold.

TABLE A4a

Patterns of alcohol consumption after the first 3 months of pregnancy, by socio-demographic characteristics

	After the first 3 months of pregnancy				
		Did not drink	Less than 1 drink per week	1–3 drinks per week	4 or more drinks per week
	n =	%	%	%	%
Age					
<20	*328*	89.3	5.5	1.8	**3.4**
20–24	*997*	**91.6**	4.3	2.3	1.8
25–29	*1,664*	**91.3**	6.8	1.5	0.4
30–34	*2,121*	84.7	11.3	3.4	0.5
35–39	*1,417*	81.0	**13.2**	**5.3**	0.5
40 and over	*283*	80.6	12.0	6.4	1.1
Ethnicity					
European	*3,607*	81.4	**14.1**	4.3	0.2
Māori	*948*	84.8	7.2	4.2	**3.8**
Pacific	*999*	**95.9**	1.7	1.2	1.2
Asian	*1002*	**97.4**	2.1	0.4	0.1

	After the first 3 months of pregnancy				
		Did not drink	Less than 1 drink per week	1–3 drinks per week	4 or more drinks per week
	n =	%	%	%	%
Highest qualification					
No secondary qual.	*489*	85.3	6.1	4.9	**3.7**
Secondary/NCEA 1–4	*1,626*	89.7	6.1	3.3	1.0
Dip/trade/NCEA 5–6	*2,081*	88.3	8.2	2.5	1.1
Bachelor's degree	*1,537*	84.8	11.3	3.8	0.1
Higher degree	*1,064*	81.9	**15.0**	3.1	0.0
Household income					
<$30k	*512*	88.9	5.5	3.3	2.3
$30k – $50k	*738*	**90.8**	6.0	2.6	0.7
$50k – $70k	*860*	**90.9**	6.3	2.1	0.7
$70k – $100k	*1,198*	88.0	8.3	3.3	0.4
$100k – $150k	*1,156*	83.2	**13.7**	2.9	0.3
> $150k	*745*	74.1	**19.9**	**6.0**	0.0
NZDep2006					
Deciles 9 & 10	*1,883*	**89.3**	5.8	2.6	**2.2**
Deciles 7 & 8	*1,423*	88.8	7.7	2.9	0.7
Deciles 5 & 6	*1,168*	85.4	11.3	3.2	0.2
Deciles 3 & 4	*1,235*	84.5	11.3	4.0	0.2
Deciles 1 & 2	*1,099*	82.9	**13.1**	3.9	0.1

* Shaded cells indicate values significantly different from the corresponding population average. Values that are significantly above the population average are further denoted in bold.

TABLE A4b

Patterns of alcohol consumption after the first 3 months of pregnancy, by attitudinal and behavioural measures

	After the first 3 months of pregnancy				
		Did not drink	Less than 1 drink per week	1–3 drinks per week	4 or more drinks per week
	n =	%	%	%	%
Women who identified alcohol to avoid in pregnancy					
	3,844	85.0	**11.8**	3.0	0.2
Current smoker					
Yes	*664*	79.2	9.3	**6.5**	**5.0**
No	*5,513*	87.3	9.6	2.8	0.3
Moderate physical activity for longer than 10 minutes					
Inactive	*1,146*	88.9	7.5	3.0	0.6
1–3 days a week	*2,300*	84.5	11.2	3.6	0.7
4+ days a week	*2,721*	87.1	9.2	2.9	0.9
Stress level – Cohen Perceived Stress					
High (score > 23)	*1,061*	85.5	10.3	3.2	0.9
Below high	*5,046*	86.8	9.1	3.2	0.8
Depression – Edinburgh Postnatal Depression Scale					
High risk (score > 13)	*599*	87.5	10.7	1.3	0.5
Below high risk	*6,211*	86.5	9.2	3.4	0.9

* Shaded cells indicate values significantly different from the corresponding population average. Values that are significantly above the population average are further denoted in bold.

TABLE A4c

Patterns of alcohol consumption after the first 3 months of pregnancy, by measures pertaining to the pregnancy

	In the first 3 months of pregnancy				
		Did not drink	Less than 1 drink per week	1–3 drinks per week	4 or more drinks per week
	n =	%	%	%	%
Planned pregnancy					
Yes	*4,090*	85.4	**11.1**	3.3	0.2
No	*2,699*	88.5	6.5	3.2	**1.8**
Have been pregnant before					
No	*2,057*	**89.8**	7.7	2.0	0.5
Yes	*4,752*	85.2	10.0	3.7	1.0
Parity					
First-born	*2,849*	88.6	8.6	2.3	0.6
Subsequent birth	*3,961*	85.2	9.9	3.9	1.0

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Social Policy Evaluation and Research Unit

superu

Families Commission Kōmihana ā Whānau

The Families Commission operates under the name Social Policy Evaluation and Research Unit (Superu)