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ORIGINAL ARTICLE – PEER REVIEWED

## Type 2 diabetes and patterns of alcohol use in a Queensland Aboriginal community

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### **Abstract**

#### **Objectives**

To assess patterns of alcohol consumption in people with and without diabetes.

#### **Methods**

Location was a large Aboriginal community in southeast Queensland. Participants with diagnosed diabetes were identified through the hospital database (49 women, 38 men), and never-diagnosed participants recruited through random household sampling (62 women, 55 men). Alcohol consumption patterns were ascertained by questionnaire.

#### **Results**

Overall, 56% of participants consumed alcohol. On average alcohol was consumed only twice per week, but the number of drinks consumed per drinking day was high (17; range: 3.5-20). Compared with never-diagnosed participants, participants with diabetes were less likely to drink (women RR=0.3, 95%CI 0.2-0.5; men RR=0.7, 95%CI 0.5-0.9), drank less per week (ANOVA: women 9.4 versus 34.4,  $p<0.001$ ; men 10.6 versus 31.2,  $p=0.004$ ), had fewer drinking days (women 0.5 versus 1.9,  $p<0.001$ ; men 0.7 versus 1.7,  $p=0.011$ ), and consumed less per drinking day (ANOVA: women 15.5 versus 18.4,  $p=0.003$ ; men 16.0 versus 16.5,  $p=0.006$ ).

#### **Conclusions**

People with diabetes are less likely than others to drink, and those who do drink consume fewer drinks on a day when they drink, suggesting they have modified their behaviour based on health advice. However, the overall quantity consumed in all groups remains high, at levels considered risky and high-risk in both the short- and long-term.

#### **Implications**

Given the diabetes and cardiovascular implications of heavy short-term and long-term alcohol use, specific patterns of alcohol use by people with diabetes should be assessed further to develop strategies to reduce the amount of alcohol consumed on a drinking day.

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### **Introduction**

Type 2 diabetes is a significant cause of excess Indigenous morbidity and mortality, and cardiovascular disease is the leading cause of Indigenous death [2]. Moderate alcohol consumption may confer some cardiovascular benefits [3], reduce the incidence of diabetes [4], and reduce cardiovascular risk among those who have diabetes [5], but the heavy use of alcohol

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can contribute to poorer cardiovascular health and may increase serious complications from diabetes, through increasing triglyceride levels [6], and can cause liver and pancreas damage [7].

Fewer Indigenous people consume alcohol than the non-Indigenous people, but when alcohol is consumed, it tends to be at much higher levels [8]. These broad trends do not consider the impact that being diagnosed with diabetes (which is very common among Indigenous people) might have on alcohol use or differences between women and men. Determining such patterns of alcohol use at a community level is especially important given its influence on diabetes management and contribution to overall cardiovascular health.

### **Methods**

This study took place in a large, urbanised Aboriginal community (population approximately 1,200) in southeast Queensland between September and December 2000. Participants with diagnosed type 2 diabetes (49 women, 38 men) were identified through the community hospital database. At the time of the study, the hospital served as an outpatient clinic providing near universal coverage of the community. Participants without diagnosed diabetes ('never-diagnosed') were recruited through household sampling (62 women, 55 men) where one person aged over 18 years from each household was randomly selected using a Kish grid.

Response rates were high (approximately 90% diagnosed and 70% never-diagnosed eligible people), but men were slightly less likely than women to participate. Participants with diagnosed diabetes were on average 15 years older than never-diagnosed participants (women: diagnosed range 19-71, mean 47 years, never-diagnosed range 18-66, mean 32 years; men: diagnosed range 27-79, mean 49 years; never-diagnosed range 19-65, mean 35 years). Further details on participant selection methods are provided elsewhere [9].

Participants were asked about the frequency of their alcohol consumption (the usual number of days per week on which alcohol was used) and the amount of alcohol they consumed (number of drinks usually consumed on a drinking day). The total number of drinks usually consumed per week was then estimated.

The study was approved by the Human Research Ethics Committee at the Australian National University.

### **Results**

Overall, 48% of women and 67% of men in the study (56% of all participants) reported that they consume alcohol. Participants with diagnosed diabetes were less likely to drink than never-diagnosed participants (women RR=0.3, 95%CI 0.2-0.5; men RR=0.7, 95%CI 0.5-0.9).

Most of those who did consume alcohol did so on fewer than two days per week. Overall, only 21% of women and 19% of men consumed alcohol on three or more days each week. On a day when alcohol was used, however, the number of drinks consumed tended to be very high (mean=17, range 3.5 to >20). No participant reported consuming just one or two drinks on a day when they were drinking. Figure 1 shows estimated weekly alcohol consumption, usual number of drinking days per week and usual number of drinks consumed on a drinking day for women and men by diabetes diagnosis.

After controlling for age, differences between diagnosed and never-diagnosed participants were significant for number of drinks per week (ANOVA: women 9.4 versus 34.4,  $p<0.001$ ; men 10.6 versus 31.2,  $p=0.004$ ), and number of drinking days per week (women 0.5 versus 1.9,  $p<0.001$ ;

men 0.7 versus 1.7,  $p=0.011$ ). Women and men with diabetes who did drink were drinking less on a drinking day than others (ANOVA: women 15.5 versus 18.4,  $p=0.003$ ; men 16.0 versus 16.5,  $p=0.006$ ). This might be partially related to age, at least among women, as the significance of the differences was reduced when age was included in the model as a covariate (women  $p=0.48$ ; men  $p=0.012$ ).

The differences between these groups may not be fully explained by the smaller proportion of people with diagnosed diabetes who drink. When only those who did drink were considered, diagnosed men drank significantly less per week than others (14.6 versus 42.4,  $p=0.039$ ) but were not drinking significantly less often (1.0 versus 2.3 times per week,  $p=0.079$ ). Diagnosed women who drank were not drinking significantly less per week than other women who drank (26.54 versus 54.2,  $p=0.156$ ), nor did they drink significantly less often (1.3 versus 2.9,  $p=0.075$ ).

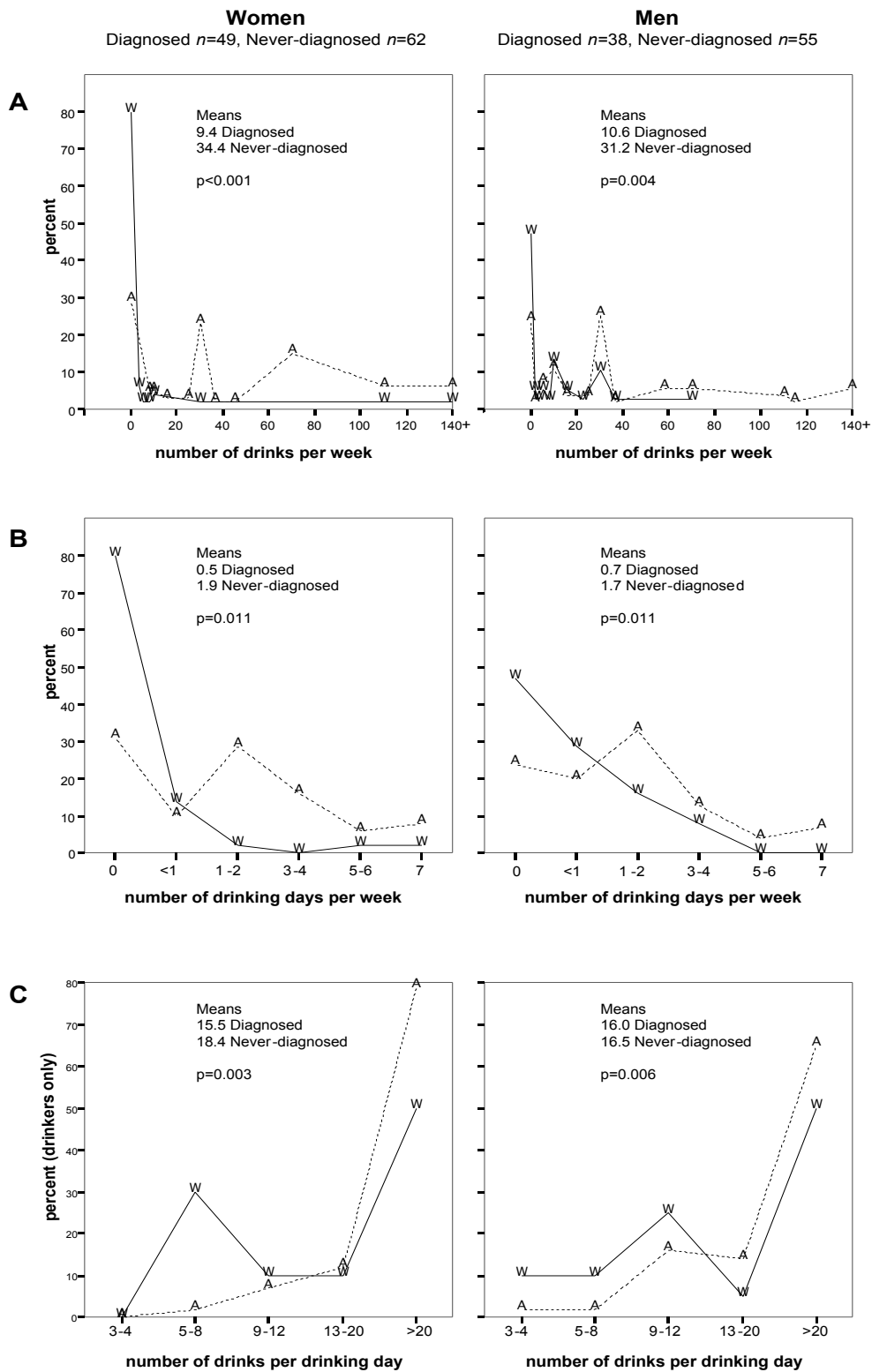


Figure 1. Usual number of drinks per week (A) (calculated by midpoint of number of days \* midpoint number of drinks per drinking day), usual number of drinking days per week (B) and usual number of drinks consumed per drinking day (C) for diagnosed (solid line) and not-diagnosed (dotted line) women and men. ANOVA was used to test significance. Age was controlled for. NB. 'Number of drinks' was not standardised, for example, as one can of beer contains approximately 1.4 'standard drinks', the number of standard drinks consumed may be much higher than the number reported. In Australia, one standard drink contains 10g of alcohol (the amount of alcohol in a 'standard' drink varies internationally) [1].

### Discussion

Of all study participants, 56% (20% diagnosed women, 69% never-diagnosed women, 53% diagnosed men, 76% never-diagnosed men) reported that they consumed alcohol. This contrasts with the 83% reported for Australia as a whole [2]. People in this community who have had diabetes diagnosed were less likely to consume alcohol than those who had never been diagnosed with diabetes. They also drink less per week, had fewer drinking days per week and consumed less per drinking day. Much of the difference was due to the greater proportion of those with diabetes abstaining from alcohol altogether. Diagnosed women and men consumed less alcohol than never-diagnosed women and men; all those who drank consumed large quantities of alcohol on a drinking day.

Low levels of alcohol consumption (such as 1-2 drinks on several days per week) is protective against cardiovascular disease and diabetes [3, 5, 10]. In this study, participants were either non-drinkers or consumed large quantities on a few drinking days per week.

According to the Australian alcohol guidelines, the risk of alcohol-related harm can be considered in terms of short-term and long-term risks (Table 1) [11]. Short-term risky or high-risk drinking refers to the quantity consumed on a given drinking day, while long-term risk refers to the usual quantity consumed each week. In the short term, risks include increased likelihood of accidents, physical and sexual assault, and a reduced capacity to protect against sexually transmitted infections and pregnancy. In the long-term, regular heavy drinking by women increases their risk of cardiovascular disease and other chronic degenerative disorders, such as liver damage and diabetes resulting from pancreatitis.

**Table 1. Australian risk classifications for alcohol-related harm in the short- and long-term [11]**

Risk type	Women		Men	
	Risky	High-risk	Risky	High-risk
<b>Short-term risks (number of drinks per day)</b>				
Increased risk of alcohol-related violence, accidents and risky behaviours	5-6	≥7	7-10	≥11
<b>Long-term risks (number of drinks per week)</b>				
Increased risk of chronic degenerative diseases such as diabetes and cardiovascular disease	15-28	≥29	29-42	≥43

In the Australian population as a whole, 12% of women and 15% of men drink one or more times per week at levels considered either risky or high-risk in the short-term [12]. Prevalence of short-term risky and high risk drinking differed in the current study according to diabetes status, with never-diagnosed women reporting the highest levels and diagnosed women the lowest (20% of diagnosed women, 29% of diagnosed men, 69% of never-diagnosed women, 62% of never-diagnosed men). Many of those with diagnosed diabetes did not drink, but those that did still consumed quantities of alcohol that were risky or high-risk in the short-term. Given the ready availability of simple sugars in alcohol, heavy alcohol consumption among diabetics, even if

infrequent, is a serious concern in terms of short-term blood glucose control and long-term contribution to cardiovascular damage.

Long-term risky and high-risk drinking has been estimated to occur in approximately 20% of Indigenous Australians, while for Australian women and men the overall prevalences are 9% and 10% respectively [13]. Results from this study indicate that among those who have never had diabetes diagnosed, up to 60% of women and 49% of men are drinking at risky and high-risk levels. The prevalence of long-term risky drinking is, however, much lower among people with diagnosed diabetes, at 6% for women and 16% for men.

The current study found that not only is the prevalence of short-term risky drinking higher among never-diagnosed women than never-diagnosed men, the long-term drinking behaviour of women is at least as risky as that of men. In the past, the heavy consumption of alcohol has been frequently associated with notions of masculinity [14, 15]. A propensity for more general risk-taking is also commonly associated with men rather than with women, especially young men, and particularly those who are disaffected and feel that they have little to lose [16]. The combination of being both male and socially disadvantaged is generally considered to produce the worst outcomes for health [17]. This no doubt remains a very important aspect of alcohol use, but this study demonstrates patterns of consumption by women also need to be addressed more comprehensively. Some of women's excess risky drinking in comparison to men's arises from the lower thresholds defining risk for women, but many women reported drinking greater quantities of alcohol than men – amounts that are two and three times those defined as high risk.

The use of self-reported alcohol consumption is a limitation of this study. 'Number of drinks' consumed was not based on Australian standard drinks, but, given that standard drinks containing 10g of alcohol are frequently smaller than individual items consumed (such as a can of beer which is approximately 1.4 standard drinks), the reporting is likely to underestimate rather than overestimate the number of standard drinks consumed by participants. As total weekly consumption was derived from the midpoints of both alcohol frequency categories (number of days per week) and number of drinks usually consumed, the study may overestimate consumption for some but underestimate for others. Further, the survey questions were framed in the present, and may not indicate longer term drinking patterns. For example, some may have considered themselves to be non-drinkers because it had been several months since they had consumed alcohol. As questions were not asked about past drinking behaviours it cannot be confirmed that being diagnosed with diabetes causes changes to drinking behaviours.

Major strengths of the study include the very high response rates (70%-90%), and the willingness of participants to answer questions relating to their alcohol consumption behaviour. Participants' willingness to take part in the study and awareness that their answers would be kept confidential suggests there is no reason to doubt the integrity of the responses.

The age difference between those diagnosed with diabetes and never-diagnosed participants was not a significant factor in the different drinking behaviours of the two groups. Age was found to have an effect only in the amount consumed per drinking day. That fewer people with diagnosed diabetes drank and that those who did drink did so less often than never-diagnosed people is probably primarily due to efforts made to follow diabetes management advice to 'drink less alcohol'. If so, this success should be built upon, with further efforts to reduce the amount consumed on a drinking day.

Changing drinking behaviours of individuals means changing the dominant drinking culture. The pattern of either abstaining from alcohol or consuming risky quantities is probably the result of interlinking factors with deep historical roots. Polarising morality around alcohol use widens the divide between non-drinkers and heavy drinkers, and fails to allow room for moderation, which could confer some cardiovascular benefits.

Alcohol may contribute to obesity through supplying excess calories [18], but a review of national data on Indigenous obesity found that those who did not drink alcohol had, on average, a higher body mass index (BMI) than those who drank [19]. This could be because heavy drinking often correlates with heavy smoking, and also because heavy drinking itself may limit the intake of foods. For example, participants in the present study who regularly missed meals sometimes reported that this was because they had been drinking or were 'grog sick'. The lower BMIs among drinkers found in the review of national data could also be because the behaviour-modifying potential of diabetes diagnosis was not considered. People with diagnosed diabetes may have both a higher BMI and be less likely to consume alcohol than those without.

An environment where there are low levels of physical activity combined with a diet that is typically energy-dense promotes both cardiovascular disease and diabetes. The effects of physical inactivity and an energy-dense diet may be exacerbated by the patterns of drinking that are taking place among never-diagnosed people, increasing their future risk of diabetes and cardiovascular disease.

Overall, there appears to have been some success in reducing alcohol intake among those who have been diagnosed with diabetes, but considerable emphasis should be placed also on finding strategies to reduce the amount that people drink 'on a drinking day'.

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