



Government of **Western Australia**
Department of **Health**

Supply of nitrous oxide

Consultation report

February 2024

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Executive summary

Nitrous oxide is used as a medicine, as a food additive and in the automotive industry. It is also inhaled as a recreational substance. Nitrous oxide is usually supplied as compressed liquified gas in small metal bulbs or (larger) cylinders.

Changing patterns of recreational use have resulted in increasing health harm around the world, including in Australia. People using nitrous oxide as an intoxicant are using it more often and in larger quantities per session.

Health harms associated with higher level recreational use include damage to the nervous system, which can be irreversible, behavioural changes and reduced ability to safely drive.

During 2020, 22 people presented to emergency departments at public hospitals in Western Australia (WA) following recreational nitrous oxide use. Eight of these patients had a prolonged hospital admission due to severe subacute degeneration of the spinal cord. The direct cost to the WA health system associated with these admissions was over \$500,000 in total.

Concerning supply patterns have emerged, with some online businesses now dedicated to express delivery of nitrous oxide, including overnight and on weekends. The businesses refer to nitrous oxide bulbs as 'nangs', a term associated with use of nitrous oxide for intoxication.

In late 2020, the Minister for Health tasked the Mental Health Commission (MHC) with responding to the increasing harm associated with use of nitrous oxide for intoxication. An expert working group was formed comprising representatives from the MHC, the Department of Health, WA Police, the National Drug Research Institute and a clinical toxicologist.

The working group recommended a suite of measures. These measures aim to:

- Educate consumers about harm reduction strategies and referral pathways.
- Upskill health professionals to recognise and treat patients experiencing nitrous oxide associated health conditions as well as encouraging prevention and early intervention.
- Provide information to industry users and retailers about the potential harms of nitrous oxide and the regulatory controls over nitrous oxide products.
- Encourage responsible supply and use by businesses supplying and using nitrous oxide as a food additive.
- Limit purchasing behaviour associated with higher risk recreational use.

In October 2022, there were national regulatory changes, with nitrous oxide being classified as a Schedule 6 poison. This has resulted in mandatory labelling controls as well as restrictions on sale to people under 16 years of age. Inclusion of nitrous oxide in Schedule 6 also means additional supply controls can be included in the Medicines and Poisons legislation.

Public consultation (online survey) on the following proposed supply controls was undertaken in September to November 2022:

- Limit the amount of nitrous oxide per sale, including both over the counter sales and deliveries (maximum 10 bulbs per transaction, unless supplied to a food business)
- Limit when nitrous oxide can be sold (no supply between 10 pm and 5 am)
- Limit how soon after ordering nitrous oxide the delivery can commence (24 hour delay between order receipt and dispatch)
- Limit the type of nitrous oxide product that can be supplied (larger volume containers only to food businesses).

The MHC also convened an industry reference group, comprising representatives from suppliers (wholesalers and retailers) and the hospitality industry. Two videoconference meetings were held in the latter half of 2022.

There were 260 responses to the online consultation survey. The majority of the responses (85%) were from individuals with the remainder from organisations and businesses.

Respondents, as a whole, either disagreed or strongly disagreed with all the proposed supply controls. However, there was evidence in responses that those working in the hospitality industry had believed the restrictions would apply to them. The industry reference group was much more supportive of there being supply restrictions to non-business users once they understood they would still be able to purchase the quantities needed to operate their business.

There was variation in responses between the self-identified groups of respondents. Generally those indicating they used nitrous oxide for home cooking or recreational use and those who identified as a member of the public, were less supportive of any restrictions whilst health professionals, organisations representing health professionals and government departments were most supportive of the introduction of additional regulatory controls over supply.

Although a minority of respondents associated with food businesses claimed they often purchase nitrous oxide between 10 pm and 5 am, feedback from the industry reference group was that it would be unlikely for hospitality venues to purchase nitrous oxide during these hours.

There was less support for a 24-hour time delay between a supplier receiving an order and dispatching this order to the recipient. This was considered to be a significant impost on both wholesalers and retailers, which would necessitate considerable changes in work processes.

Advice from the industry reference group was that cylinders are not used in the hospitality industry and nitrous oxide in this format appears to be targeted at recreational users.

Both wholesalers and retailers provided a range of responses to the questions about the impact the proposed controls would have on their business financially. For wholesalers, 4 of 10 believed there would be an extreme financial impact. For retailers, 10 of 17 thought the financial impact would be large, very large or extreme.

Overall, respondents did not believe the proposed restrictions would have any impact on health harm associated with recreational use of nitrous oxide. However, a greater proportion of health professionals believed there would be a positive impact.

The final regulatory changes will be determined by the Minister for Health.

1 Introduction

Nitrous oxide is usually supplied as compressed liquified gas in small metal bulbs or larger cylinders.

Nitrous oxide is used as a medicine, as a food additive and in the automotive industry. It is also inhaled as a recreational substance.

Use of nitrous oxide as an intoxicant has occurred for centuries. Although recreational use of any substance always carries some risk, people who use nitrous oxide infrequently and in low doses do not usually experience significant harm. However, more recent changes in patterns of recreational nitrous oxide use have resulted in increasing reports of serious and prolonged adverse effects.

Increasing use of nitrous oxide as a recreational drug is a worldwide phenomenon. Australian data also shows increasing use of inhalants, particularly over the last five years and nitrous oxide is one of the most commonly used substances in this class.¹

People who use nitrous oxide for the purpose of intoxication are now using this substance more often and in larger quantities per session. In Western Australia (WA), the changes in the pattern of recreational use of nitrous oxide, and the subsequent health harms, are similar to other parts of Australia.²

Health harms associated with higher level recreational use of nitrous oxide include damage to the nervous system, which can be irreversible, behavioural changes and negative effects on the ability to safely drive.

The changing pattern of recreational use has also triggered an increase in the number of businesses offering online ordering of nitrous oxide bulbs and cylinders with fast delivery (sometimes within 15 minutes of ordering) at any time of the day or night.

In late 2020, the WA Minister for Health tasked the Mental Health Commission with responding to the increasing harm associated with use of nitrous oxide for intoxication.³ The Minister noted a range of responses were under consideration including targeted education, industry codes and regulatory changes. The Minister also acknowledged it was important that any responses avoided unnecessary impacts on the sale and supply of nitrous oxide for legitimate uses.

The Mental Health Commission convened an expert working group with members from the Commission, the Department of Health, WA Police, National Drug Research Institute (Curtin University)⁴ and a clinical toxicologist. The working group recommended a number of strategies to reduce harm associated with use of nitrous oxide as an intoxicant and the Mental Health Commission is progressing these strategies. The focus of this report is proposed controls over supply through the Medicines and Poisons Regulations 2016. These Regulations are administered by the Department of Health and determined by the Minister for Health.

¹ Australian Institute of Health and Welfare 2020. National Drug Strategy Household Survey 2019. Drug Statistics series no. 32. PHE 270. Canberra AIHW.

² Grigg J, Lenton S (2020). Increasing trends in self-reported use of nitrous oxide among WA EDRS samples. National Drug and Alcohol Research Centre, University of New South Wales, NSW.

³ Western Australia, Legislative Assembly 2020, *Debates*, 19 November, pp 8082n-8084a. Available at <[A40+S1+20201119+p8082b-8084a.pdf](https://www.parliament.wa.gov.au/A40+S1+20201119+p8082b-8084a.pdf) (parliament.wa.gov.au)>

⁴ See <https://ndri.curtin.edu.au/>.

2 Health harms associated with recreational use of nitrous oxide

2.1 Damage to the nervous system

There have been multiple reports of people experiencing damage to their nervous system, in association with recreational use of nitrous oxide, in countries across the world^{5,6,7}, including in Australia.^{8,9,10,11,12}

Patients have been diagnosed with a range of neurological complaints including: myeloneuropathy, peripheral neuropathy, polyneuropathy, myelopathy and subacute degeneration of the spinal cord.

The syndrome known as 'subacute degeneration of the spinal cord' occurs due to irreversible inactivation of vitamin B12 by nitrous oxide. The effect of nitrous oxide on vitamin B12 is described as a 'functional deficiency' because despite relatively normal vitamin B12 blood levels, the activity of this vitamin will still be impaired. This has effects on a number of biochemical pathways, including decreasing the body's ability to make the proteins necessary to form the fatty sheath (myelin sheath) that surrounds some nerve cells. This fatty sheath speeds transmission of nerve signals and is essential for normal spinal nerve function.

Nerve fibres that control both movement and sensation are damaged. A general feeling of weakness is often the first sign of this damage. Tingling, a pins-and-needles sensation and numbness can be felt in both hands and feet. People may lose the sense of where their limbs are (proprioception) and may not be able to feel vibrations. The limbs feel stiff, movements become clumsy and walking may become more difficult.

Treatment of the neurological effects involves ceasing use of nitrous oxide, administering vitamin B12 injection and other supplements, providing standard treatments for neurological pain and, if needed, a rehabilitation program and psychological support.

Information about 22 people who presented to public hospitals in New South Wales indicates thirteen required inpatient physical rehabilitation due to poor mobility.⁹ One of these 13 cases returned to their home country for rehabilitation and of the remaining 12, nine required walking aids at discharge. Median length of hospital admission was 31 days.

⁵ Keddie S, Adams A, Kelso A et al. No laughing matter: subacute degeneration of the spinal cord due to nitrous oxide inhalation. *J Neurol* 2018;265:1089-1095.

⁶ Garakani A, Jaffe R, Savla D et al. Neurologic, psychiatric and other medical manifestations of nitrous oxide abuse: a systematic review of the case literature. *Am J Addict* 2016;25:358-369.

⁷ Yu, M, Qiao, Y, Li, W, Fang, X et al. Analysis of clinical characteristics and prognostic factors in 110 patients with nitrous oxide abuse. *Brain and Behavior* 2022;12:e2533.

⁸ Redmond J, Cruse B, Kiers L. Nitrous oxide-induced neurological disorders – an increasing public health concern. *Intern Med J* 2021 Sep 27. doi: 10.1111/imj.15544. Epub ahead of print. PMID: 34569693.

⁹ Lightfoot E, Brownlie D, Lightfoot J. Nitrous oxide toxicity: When laughing gas is no laughing matter – a discussion of two cases. *Emerg Med Australas* 2020;32:710-711.

¹⁰ Chiew A, Raubenheimer J, Berling I et al. Just "nanging" around - harmful nitrous oxide use. A retrospective case series and review of internet searches, social media posts and the coroner's database. *Intern Med J* 2021 May 24. doi: 10.1111/imj.15391. Epub ahead of print. PMID: 34029427.

¹¹ Evan E, Evans M. Nangs, balloons and crackers. Recreational nitrous oxide neurotoxicity. *Aust J Gen Pract* 2021;50:834-838.

¹² Mosalski S, Tanner A, Shiner C. Recreational nitrous oxide misuse is resulting in serious neurological impairment and persistent disability among users. *Med J Aust* 2021;215:237.

Case series from the United States¹³ and the United Kingdom¹⁴ have similarly found that very few patients fully recovered before hospital discharge.

The risk of nerve damage has been shown to increase as the amount of nitrous oxide used per session increases.¹⁵ For people who reported using 1 to 2 bulbs per session, the probability of reporting paraesthesias (abnormal nerve sensation, such as tingling or pricking, often described as 'pins and needles') was 1.86%. By contrast, for those reporting using 100 bulbs per session, the probability of reporting paraesthesia was 8.48%.

2.2 Behavioural changes

Changes in behaviour can also occur when nitrous oxide is used, including concurrently with nervous system effects. These include becoming irritable, agitated, confused and drowsy. Some people develop psychiatric symptoms such as delusions (sometimes with paranoia) and delirium.

2.3 Other adverse effects

Most recreational users will discharge nitrous oxide into a balloon and then inhale from this. When the gas is discharged from a bulb or cylinder it is intensely cold and under pressure. There have been reports of severe frostbite to the nose, lips and throat (including the vocal chords) and ruptures in lung tissue where recreational users have inhaled nitrous oxide directly from a bulb or cylinder.

Inhalation of nitrous oxide displaces air from the lungs, which temporarily prevents oxygen from reaching the blood. When nitrous oxide is used medically, it is mixed with oxygen prior to administration. Although uncommon, suffocation or asphyxiation can occur due to oxygen depletion when nitrous oxide is inhaled for the purpose of intoxication. A recent death in Queensland has been attributed to a person becoming unconscious after inhaling nitrous oxide and subsequently drowning.¹⁶ However, this media report does not indicate whether other drugs, including alcohol, were involved in this serious incident and, if so, these may have also influenced the outcome.

2.4 Effects on driving

A small study of ten subjects who inhaled medical nitrous oxide and were then tested on a driving simulator showed negative effects on driving ability for up to 30 minutes after the short exposure to nitrous oxide.¹⁷ A more recent study of the use of a 50:50 mix of nitrous oxide and oxygen for analgesia and sedation in patients undergoing colonoscopies similarly showed that it took 30 minutes for psychomotor test results to return to baseline, even though patients were assessed as having clinically recovered within 3 to 25 minutes (median 8 minutes).¹⁸

There are emerging reports of traffic crashes, where the driver has been inhaling nitrous oxide whilst driving. Media reports in the Netherlands document the Dutch police reporting 960 traffic

¹³ Garakani A, Jaffe R, Savla D et al. Neurologic, psychiatric and other medical manifestations of nitrous oxide abuse: a systematic review of the case literature. *Am J Addict* 2016;25:358-369

¹⁴ Keddie S, Adams A, Kelso A et al. No laughing matter: subacute degeneration of the spinal cord due to nitrous oxide inhalation. *J Neurol* 2018;265:1089-1095.

¹⁵ Winstock AR, Ferris JA. Nitrous oxide causes peripheral neuropathy in a dose dependent manner among recreational users. *J Psychopharmacol* 2020;34:229-236.

¹⁶ Webster K, Cansdale D, 2023, 'Man drowns in Surfers Paradise spa after inhaling 'nangs', police say', ABC News, 20 February, accessed 3 March 2023, < <https://www.abc.net.au/news/2023-02-20/man-drowned-at-surfers-paradise-spa-after-inhaling-nangs/101997266>>

¹⁷ Moyes D, Cleaton-Jones P, Lelliot J. Evaluation of driving skills after brief exposure to nitrous oxide. *South Afr Med J* 1979;56:1000-1002.

¹⁸ Trojan J, Saunders BP, Woloshynowych M, Debinsky H, Williams C. Immediate recovery of psychomotor function after patient-administered nitrous oxide/oxygen inhalation for colonoscopy. *Endoscopy* 1997;29:17-22.

accidents where the driver was under the influence of nitrous oxide in 2019 compared to only 60 such accidents in 2016. In 2019, Veilig Verkeer, a Dutch road safety organisation, led a social media campaign to draw attention to the number of traffic accidents in the Netherlands that were thought to be connected to the use of 'laughing gas' behind the wheel.¹⁹

There is at least one media report claiming a driver was seen inhaling nitrous oxide whilst driving on a freeway in Perth.²⁰

There is no roadside test for the presence of nitrous oxide. However, it is not surprising that driver impairment can occur following inhalation of a substance that is known to cause euphoria, sedation, reduced coordination of movements, blurred vision, confusion and disorientation, impaired memory and cognition, dissociation and dizziness and/or light-headedness.

2.5 Cases presenting to Western Australian emergency departments

During 2020 there were 22 nitrous oxide related presentations to emergency departments at WA public hospitals, including 8 patients with severe subacute degeneration of the spinal cord. People presenting to WA public hospitals with nitrous oxide associated harm triggered, in part, the concerns raised in the WA Parliament in November 2020.

Six of the eight patients with severe neurological symptoms were male and the mean age was 27 years (range 19 to 36 years). These patients reported heavy and chronic nitrous oxide exposure, with a mean number of bulbs used per day of 150 (range 50 to 300 per day) and a duration of use between 3 months and "many years".

These patients required lengthy hospital admissions. The mean length of stay was 12 days (range 3 to 32 days) in an acute care hospital, followed by a mean of 40 days (range 32 to 45 days) at a rehabilitation centre. Some patients reported ongoing functional disability at follow-up, including difficulty walking, poor balance and nerve pain.

2.6 Who uses nitrous oxide as a recreational drug?

Nitrous oxide is known as a 'party drug' and is commonly used at night venues, clubs, pubs, events like music festivals and other parties attended by young adults.

Data from the United States showed nitrous oxide use was most common in the 13 to 39 year age group, with a mean age of 26.4 years for one data system (NEISS²¹) and 27.6 years for another data system (FAERS²²).²³ In the Netherlands, young adults up to 35 years are most likely to use this recreational drug and cases reported to poisons centres in the United Kingdom had a median age of 23 years (range 6 to 34 years).¹⁸ In all these data sets, use by males was more common than use by females.

¹⁹ Available at < [Campagne tegen lachgas achter het stuur: 'Onbegrijpelijk dat mensen dat doen' | Veilig Verkeer Nederland \(vvn.nl\)](https://www.vvn.nl/)>

²⁰ 7 News 2020, 'Perth driver caught on camera using what appears to be a nitrous oxide canister, or 'nang'', *Perth Now*, 6 February, accessed 21 February 2023, <<https://www.perthnow.com.au/news/perth/perth-driver-caught-on-camera-using-what-appears-to-be-a-nitrous-oxide-canister-or-nang-ng-b881455381z>>

²¹NEISS = National Electronic Injury Surveillance System

²² FAERS = FDA Adverse Event Reporting System

²³ Forrester M. Nitrous oxide misuse reported to two United States data systems during 2000 to 2019. *J Addict Dis* 2020;39:46-53.

In Australia, information about recreational drug use is collected through the Australian Institute of Health and Welfare's National Drug Strategy Household Survey (NDSHS)²⁴ and through the Ecstasy and Related Drugs Reporting System (EDRS).²⁵

The NDSHS collects information from teenagers and adults residing in private dwellings across Australia and there were 22,272 completed responses in 2019.

Data collection for the EDRS is via interviews conducted annually with sentinel samples of people who regularly use ecstasy/MDMA and/or other illicit stimulants, recruited from all capital cities of Australia (N=708 in 2023, N=700 in 2022). The EDRS sample is not intended to be representative of all consumers or of drug use in the general population and is used to monitor for emerging drug trends. The EDRS interviews capture information about drugs that are routinely used in the context of entertainment venues and other recreational locations such as nightclubs, dance parties, pubs and music festivals.

In the most recently published report of the NDSHS (2019), the per cent of people (aged 14 years and over) reporting use of inhalants in the previous 12 months had risen from 0.4% in 2011 to 1.0% in 2016 and 1.4% in 2019. Nitrous oxide and 'poppers' (amyl nitrate and other nitrates) were the most common forms of inhalants (reported by 6 out of 10 people).

In the most recent EDRS interviews (2023; N=708), 40% of the national sample reported recent (past 6 month) use of nitrous oxide, stable from 45% in 2022. Prior to 2021, reports of recent use had been steadily increasing, more than doubling between 2014 and 2020 (23% and 54% respectively). However, there has been significant variation between the states and territories. For example, in 2022, recent use ranged from 26% in the Hobart sample to 70% in the Perth sample.

In 2019, following an upward trend in reports of recent use in the Perth sample (13% in 2009; 62% in 2019), the WA EDRS research team identified nitrous oxide use as an emerging drug of concern warranting further investigation. Thus, in 2020, a more detailed analysis of the Perth EDRS data was published in a special bulletin documenting increasing trends in recent use, frequency of recent use and quantities used per session²⁶. This bulletin also reported that, when analysing the 2019 national EDRS data, nitrous oxide was more commonly used by younger adults. For example, those in the 18 to 19 years age group were five times more likely to report recent use than respondents over 24 years old, and those in the 20 to 24 years age group were nearly three times more likely to report recent use than those over 24 years old. There was also a greater proportion of males reporting recent use (57% compared to 46% of females).

While there was a significant decline in self-reported recent use between 2020 and 2021 (62% and 45% respectively), over three-quarters of the sample reported recent use in 2022 (70%), representing the highest percentage observed in the Perth sample since EDRS monitoring

²⁴ Available at <<https://www.aihw.gov.au/about-our-data/our-data-collections/national-drug-strategy-household-survey>>

²⁵ Available at <<https://ndarc.med.unsw.edu.au/project/ecstasy-and-related-drugs-reporting-system-edrs>>.

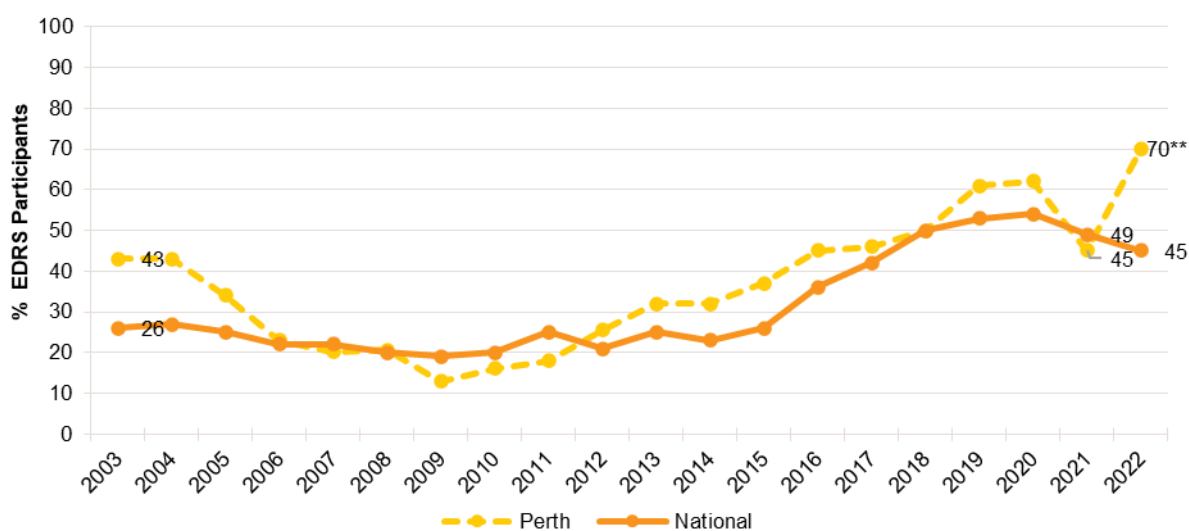
²⁶ Grigg, J. & Lenton, S. (2020). Increasing trends in self-reported use of nitrous oxide among WA EDRS samples. Drug Trends Bulletin Series. Sydney: National Drug and Alcohol Research Centre, University of New South Wales. <http://doi.org/10.26190/5f20ea395c544>.

began.^{27,28} In 2023, recent use was reported by 50% of the sample, a significant decline from 2022.²⁹

Reasons for the changes in self-reported recent use are unclear. However, when the 2020 survey asked about impacts of COVID-19, over half of recent consumers (52%) reported that they reduced or completely ceased nitrous use when COVID-19 associated restrictions came into effect.

With the exception of 2019, the median frequency of recent (past 6 month) nitrous oxide use has remained low and stable. For example, in 2023, nitrous oxide was used on a median of 4 days (Interquartile range [IQR]=1-10; stable from 4 days in 2021 and 2022). However, in 2022 and 2023, the median quantities used per session were the highest observed in the Perth sample since monitoring began. In 2023, 20 bulbs were used in a 'typical' session (IQR=5-50), stable from 15 bulbs (IQR=5-50, $p=0.821$) in 2022 and the median maximum amount used per session was 30 bulbs (IQR=10-80), stable from 30 bulbs in 2022 (IQR=10-50, $p=0.878$).

Figure 1: Reports of recent (past 6 month) nitrous oxide use among EDRS participants, Perth and national, 2003 to 2022²⁸



Note. Significance for 2021 versus 2022 presented in figure; ** $p<0.010$.

2.7 Use patterns and user characteristics associated with greater harm

Greater health harm is associated with:

- Using large amounts of nitrous oxide in a single session
- Using nitrous oxide often and
- Using nitrous oxide for a long period of time.

In recent years, new patterns of supply have emerged which facilitate harmful use patterns. Certain suppliers appear to be targeting recreational users by providing large quantities of

²⁷ Grigg, J. & Lenton, S. (2022). Western Australian Drug Trends 2021: Key Findings from the Ecstasy and Related Drugs Reporting System (EDRS) Interviews. Sydney: National Drug and Alcohol Research Centre, UNSW Sydney. DOI: 10.26190/jb6p-y775

²⁸ Grigg, J. & Lenton, S. (2022). Western Australian Drug Trends 2022: Key Findings from the Ecstasy and Related Drugs Reporting System (EDRS) Interviews. Sydney: National Drug and Alcohol Research Centre, UNSW Sydney. DOI: 10.26190/eczj-vc73

²⁹ Grigg J & Lenton S. Western Australian Drug Trends 2023: Key Findings from the Ecstasy and Related Drugs Reporting System (EDRS) Interviews. Sydney: National Drug and Alcohol Research Centre, UNSW Sydney; 2023. DOI: 10.26190/88jv-z026

nitrous oxide along with associated paraphernalia, offering 24 hr delivery services with rapid order fulfilment and often promoting their activities through social media (see also Section 3).

In Australia, two case series^{30,31} of patients presenting to hospitals with neurological disorders found these patients were of a similar age to the broader group of people who use nitrous oxide recreationally (median age 22 years and 23.8 years respectively). However, a greater proportion of the patients were female (50% or more). There was a predominance of international students, particularly of Asian ethnicity.

People with an already low level of vitamin B12 are at risk of developing neurological dysfunction at lower usage levels. Spinal cord degeneration has been reported following a single short exposure to nitrous oxide, in association with pre-existing vitamin B12 deficiency.³²

There is evidence nerve damage occurs more commonly in females, possibly due to the higher incidence of vitamin B12 deficiency in women of reproductive age and possibly also related to diet (higher rates of vegetarian and vegan diets).³³

3 Current and emerging supply patterns

Nitrous oxide bulbs are not generally sold in major supermarkets but are available from convenience stores, catering and hospitality suppliers (both online and from 'bricks and mortar' stores, including via 'click and collect' transactions) and home kitchenware suppliers.

More recently, online only businesses dedicated to express delivery of nitrous oxide bulbs and cylinders have emerged. These type of businesses also sell other paraphernalia associated with use of nitrous oxide as an intoxicant such as balloons, whipped cream dispensers and 'cream crackers'. Cream crackers, also known as NOS crackers, are devices used to access the gas in nitrous oxide bulbs without needing a whipped cream dispenser. These devices cannot be used to dispense nitrous oxide for use as a food additive.

Another hallmark of these online businesses is use of the term 'nangs' to describe the nitrous oxide bulbs they offer for sale. This term is associated with the use of nitrous oxide as an intoxicant and is not a term generally used in the catering and hospitality industry.

In WA and interstate, online only businesses claiming to be able to deliver 'nangs' within 15 to 60 minutes of an order being placed and which deliver 'nangs' overnight, particularly on Friday and Saturday evenings, can be easily found by searching online. There have been a number of

³⁰ Redmond J, Cruse B, Kiers L. Nitrous oxide-induced neurological disorders – an increasing public health concern. *Intern Med J* 2021 Sep 27. doi: 10.1111/imj.15544. Epub ahead of print. PMID: 34569693.

³¹ Chiew A, Raubenheimer J, Berling I et al. Just "nanging" around - harmful nitrous oxide use. A retrospective case series and review of internet searches, social media posts and the coroner's database. *Intern Med J* 2021 May 24. doi: 10.1111/imj.15391. Epub ahead of print. PMID: 34029427.

³² Cartner M, Sinnott M, Silburn P. Paralysis caused by "nagging". *Med J Aust* 2007;187:366-367.

³³ Winstock AR, Ferris JA. Nitrous oxide causes peripheral neuropathy in a dose dependent manner among recreational users. *J Psychopharmacol* 2020;34:229-236.

reports in the mass media describing businesses of this type in Perth delivering nitrous oxide for use as an intoxicant.^{34, 35, 36}

4 National regulatory response

From 1 October 2022, nitrous oxide (other than nitrous oxide intended for use as a medicine) was classified as a Schedule 6 poison in the national Poisons Standard³⁷. Nitrous oxide for medical use has been classified as a Schedule 4 (prescription only) medicine for many years and remains in this category.

The decision³⁸ to include nitrous oxide in Schedule 6 was prompted by concern about health harms associated with intentional misuse of this gas. The scheduling decision maker³⁹ within the Commonwealth Department of Health and Aged Care stated "...creating a Schedule 6 entry for nitrous oxide will contribute positively to public health and safety while enabling continued industrial access (hospitality, engineering and scientific research). The new scheduling may directly help mitigate harms through labelling, and complement any educational strategies and counselling associated with substance abuse".

Inclusion of nitrous oxide in Schedule 6 provides for inclusion of specific labelling requirements in the national Poisons Standard. In addition to the labelling requirements applicable to all Schedule 6 substances, products containing nitrous oxide must include the following statements on their labels:

- WARNING – May cause irreversible nerve damage if inhaled
- Do not intentionally inhale contents.

In WA, the schedules of the Poisons Standard are adopted by reference, through the *Medicines and Poisons Act 2014*. This means all nitrous oxide preparations are in either Schedule 6 (for non-therapeutic use) or Schedule 4 (for therapeutic use) in this state.

The inclusion of a substance in Schedule 6 in WA results in the following regulatory controls:

- Packaging and labelling requirements, adopted by reference from the Poisons Standard.
- Products can only be supplied to people apparently aged 16 years and older.
- Must be stored out of reach of children in the retail setting, with national guidance for retailers available on the Therapeutic Goods Administration (TGA) website⁴⁰.
- Must not be disposed of in a manner that constitutes, or is likely to constitute, a risk to public health.

³⁴ Hickey, P 2018, 'Troubling phenomenon: potentially deadly nitrous oxide being delivered to people's front doors', *WA Today*, 6 February, accessed 14 February 2023, <<https://www.watoday.com.au/national/western-australia/troubling-phenomenon-potentially-deadly-nitrous-oxide-being-delivered-to-peoples-front-doors-20180206-h0uig9.html>>

³⁵ Flint J, 2018, 'Nitrous oxide: dangerous drug delivery as easy as pizza in Perth', *Perth Now*, 9 December, accessed 16 February 2023, <<https://www.perthnow.com.au/news/health/nitrous-oxide-dangerous-drug-delivery-as-easy-as-pizza-in-perth-ng-b881043293z>>

³⁶ Baker, E 2019, 'Doctors call for legally available nangs, or nitrous oxide bulbs, to be banned', *Perth Now*, 24 June, accessed 16 February 2023, <<https://www.perthnow.com.au/news/7-news-perth/doctors-call-for-legally-available-nangs-or-nitrous-oxide-bulbs-to-be-banned-ng-b881240551z>>

³⁷ Available at <<https://www.tga.gov.au/how-we-regulate/ingredients-and-scheduling-medicines-and-chemicals/poisons-standard-and-scheduling-medicines-and-chemicals/poisons-standard-susmp-0>>

³⁸ Notice of final decisions to amend (or not amend) the current Poisons Standard in relation to nitrous oxide. 8 October 2021. Available at <<https://www.tga.gov.au/resources/publication/scheduling-decisions-final/notice-final-decisions-amend-or-not-amend-current-poisons-standard-relation-nitrous-oxide>>

³⁹ A delegate of the Secretary of the Department of Health and Aged Care.

⁴⁰ National guideline for retail storage of Schedule 6 and Schedule 7 poisons, 11 September 2015. Available at <<https://www.tga.gov.au/resources/publication/publications/national-guideline-retail-storage-schedule-6-and-schedule-7-poisons>>

- An offence to supply in circumstances where the suppliers could reasonably suspect the use of the poisons will be in a way that could be expected to pose a serious threat to health, safety and welfare of an individual or the public more broadly.

Nitrous oxide is commonly used as a food additive (food additive code number 942). There is an exemption from scheduling for all food additives once they have been added to food. This means aerosol cans of cream, which contain nitrous oxide premixed with liquid cream, emulsifiers and stabilisers are not in Schedule 6 and are therefore not regulated through the Medicines and Poisons Act. As with all foods offered for sale in WA, these products are regulated through the *Food Act 2008*.

5 Policy objectives

The primary policy objective is to reduce serious health harm associated with recreational use of nitrous oxide. However, as nitrous oxide has a number of legitimate uses and, in particular, is widely used in the hospitality sector, any measures to reduce health harms must be balanced with maintaining a suitable level of access for other users.

A suite of measures is considered necessary to reduce serious public health harm associated with use of nitrous oxide as an intoxicant.

These measures aim to:

- Educate consumers about harm reduction strategies and referral pathways.
- Upskill health professionals to recognise and treat patients experiencing nitrous oxide associated health conditions as well as encouraging prevention and early intervention.
- Provide information to industry users and retailers about the potential harms of nitrous oxide and the regulatory controls over nitrous oxide products.
- Encourage responsible supply and use by businesses supplying and using nitrous oxide as a food additive.
- Limit purchasing behaviour associated with higher risk recreational use.

6 Options to achieve policy objectives

Methods to achieve the policy objectives include:

1. Provision of education and information only
2. Introduction of supply controls through regulation in combination with education and information provision
3. Introduction of supply controls only.

A combination of education and regulation is considered the most appropriate, given the evidence of:

- Use for intoxication by increasing numbers of people in WA.
- Changing patterns of use, with increased prevalence of use patterns associated with greater harm.
- A rise of businesses apparently dedicated to supplying the recreational market.
- An increase in the number of people being admitted to public hospitals with serious neurological damage associated with nitrous oxide use.

However, as nitrous oxide has legitimate use as a food additive, it is important for any regulatory controls over supply to be developed in a manner that minimises impact on businesses supplying and using nitrous oxide as a food additive.

Proposed supply controls, as detailed in the Consultation Regulatory Impact Statement: Nitrous Oxide Supply⁴¹ are intended to apply only when nitrous oxide is not being purchased by or supplied to a food business. This would mean a food business would still be able to purchase the quantity of nitrous oxide they require when they need it. However, they would need to show their supplier evidence of being a legitimate food business.

Consultation options for control of supply of nitrous oxide in Schedule 6, when not denatured with sulfur dioxide, were as follows:

- Limit the amount of nitrous oxide per sale, including both over the counter sales and deliveries
- Limit when nitrous oxide can be sold
- Limit how soon after ordering nitrous oxide the delivery can commence
- Limit the type of nitrous oxide product that can be supplied

It was also proposed there be a clause to allow the Chief Executive Officer (CEO) of the Department of Health to authorise a person (who is not operating a registered food business), a non-food business or organisation to purchase nitrous oxide in Schedule 6 in a manner outside the proposed supply controls.

6.1 Limit the amount of nitrous oxide per transaction or delivery

Each small bulb of nitrous oxide contains 8g of compressed liquified gas, which is sufficient to whip 500 mL of cream via a whipped cream dispenser. The smallest commercial pack of bulbs is a box of 10 bulbs, which means one box of bulbs could be used to whip 5 litres of liquid cream, to produce around 15 litres of whipped cream.

Nitrous oxide is also used for other culinary preparations such as foams. Similar to cream, one bulb of nitrous oxide will whip 500 mL of liquid into a foam. Similarly, a drink known as 'nitro coffee', which can be made using either nitrogen or nitrous oxide, will also require approximately one bulb to make one tall glass of coffee.

The proposal taken to consultation was that individuals and end-user businesses, that are *not* food businesses, would be limited to purchasing one box of 10 bulbs per transaction. This limit would be applicable to both 'in person' purchasing and online sales.

6.2 Limit when nitrous oxide can be sold

In 2019, South Australia amended their *Controlled Substances (Poisons) Regulations 2011*⁴² to impose penalties on both 'bricks and mortar' stores and online businesses selling nitrous oxide by making it an offence to sell between the hours of 10 pm and 5 am.

It was proposed the same restrictions on hours of supply be applied in WA, including both over the counter sales at 'bricks and mortar' stores and delivery following an order.

6.3 Limit how soon orders for nitrous oxide can be delivered

Online businesses selling nitrous oxide, that is reported to be used recreationally, routinely advertise they are able to deliver within fifteen minutes to an hour of an order being placed.

It was proposed, as a disincentive to this type of marketing, that there be a 24 hour delay from when an order is received by the seller to when the order can be dispatched for delivery. The

⁴¹ Available at: https://consultation.health.wa.gov.au/medicines-and-poisons-regulation-branch/regulation-of-nitrous-oxide-supply/user_uploads/cris-supply-of-nitrous-oxide-september-2022.pdf

⁴² Available at: [https://www.legislation.sa.gov.au/lz?path=/c/r/controlled%20substances%20\(poisons\)%20regulations%202011](https://www.legislation.sa.gov.au/lz?path=/c/r/controlled%20substances%20(poisons)%20regulations%202011)

intention was that this restriction would only be applicable where an order is made by an individual or an end-user businesses that is *not* a food business.

This restriction would only be applicable to orders rather than direct 'in person' sales within a 'bricks and mortar' store.

6.4 Limit the type of product that can be supplied

It was proposed that supply of cylinders of food grade nitrous oxide be limited to food businesses only. These cylinders generally contain 580 g nitrous oxide, which is the equivalent of 72.5 x 8 g bulbs.

Larger cylinders of nitrous oxide for medical use are regulated as Schedule 4 medicines and cannot be directly supplied to members of the public.

This would mean an individual or an entity, that is not a food business, could only purchase food additive nitrous oxide in small bulbs.

6.5 Option for approval of purchase by a non-food business, organisation or individual

This clause would provide an avenue for purchase of nitrous oxide where it was required for *bona fide* industrial, research or educational purposes. It is not anticipated this clause would be used extensively and this will limit the impact on workload for the Department of Health.

Any such authorisation would need to be in writing and specify the quantity, type of product and could be for a defined period. This type of authorisation would provide an option for an individual or an entity that is not a food business, to be exempted from one or more of the restrictions on sale that would normally apply.

7 Impact assessment

7.1 Cost of public health harm

The modified Rankin scale (mRS) is commonly used to measure the degree of disability of people following a stroke. This scale has also been used for assessing disability associated with other neurological conditions. The mRS runs from zero to 6 with zero meaning 'no symptoms' and 6 meaning the patient has died.

Published cases of people admitted to hospital with neurological disorders associated with nitrous oxide use in New South Wales⁴³ and Victoria⁴⁴ reported a mRS score of 3 or 4 at discharge for many patients. A mRS score of 3 is described as 'moderate disability, requires some help, but able to walk unaided' whilst a mRS score of 4 means 'moderately severe disability, unable to attend to own bodily needs without assistance and unable to walk unassisted'.

Given that neurological dysfunction related to nitrous oxide use can result in ongoing disability and the age group most commonly affected is people aged under 25 years, the financial cost to the health system, the person with the disability and society more generally is likely to be significant.

⁴³ Blair C, Tremonti C, Edwards L, Haber P, Halmagyi G. Vitamin B12 supplementation futile for preventing demyelination in ongoing nitrous oxide misuse. *Med J Aust* 2019;211:428-429.

⁴⁴ Redmond J, Cruse B, Kiers L. Nitrous oxide-induced neurological disorders – an increasing public health concern. *Intern Med J* 2021 Sep 27. doi: 10.1111/imj.15544. Epub ahead of print. PMID: 34569693.

Financial impacts include:

- Costs associated with inpatient admission, including both acute care and rehabilitation.
- Costs associated with community-based rehabilitation after discharge from hospital.
- Costs associated with ongoing disability such as loss of earnings, equipment needs and care needs, including medical and psychosocial aspects.

As described in Section 2.5, during 2020, eight people were admitted to WA public hospitals with severe neurological issues related to nitrous oxide use. The total cost to WA Health associated with seven of these admissions⁴⁵, including both inpatient and outpatient follow-up, was \$598,928 and, on a per patient basis, ranged from \$7425 to \$289,686.

These eight patients ranged in age from 19 to 36 years. If any of these patients were employed, they could also have lost earnings during, at the very least, their period of inpatient admission. Based on average weekly earnings (full-time total hours⁴⁶), an average inpatient admission of 12 days would amount to an earning loss of \$3107 per patient. However, given that all these patients had periods of rehabilitation after their inpatient admission (average 40 days) and had ongoing functional disability, their loss of earnings is likely to be considerably higher.

These figures indicate significant cost to both the WA Health system and those directly affected by the adverse outcomes of use of larger quantities of nitrous oxide for the purpose of intoxication.

7.2 Impact of proposed supply controls for businesses

The intent was to balance the introduction of supply controls to reduce harmful purchasing behaviour against retaining access for legitimate users of nitrous oxide as a food additive, particularly for hospitality businesses.

For businesses that sell nitrous oxide by wholesale or retail, the proposed restrictions will have some impact as these businesses will have an obligation to ensure they only supply larger quantities of nitrous oxide to food businesses and other authorised recipients, such as an individual or entity authorised by the CEO of the Department of Health.

In most cases, a food business will be registered under the *Food Act 2008*. Registered food businesses are issued a certificate of registration. This means there is a mechanism by which a supplier of food additive nitrous oxide can determine whether a business, including sole traders, is eligible to purchase larger quantities of nitrous oxide.

For businesses that sell to the legitimate market for use as a food additive, there should be little impact on sales volume.

There is some risk of the costs associated with checking whether a purchaser is a legitimate food business being passed on to customers, by way of product price increases.

⁴⁵ Costs were not available for one patient, their length of stay (LOS) was 3 days which was the shortest LOS for all patients in the case series.

⁴⁶ November 2021 average weekly total earnings for full-time adults (seasonally adjusted), available at: [Average Weekly Earnings, Australia, November 2021 | Australian Bureau of Statistics \(abs.gov.au\)](https://www.abs.gov.au/australian-bureau-of-statistics/publications/average-weekly-earnings-australia-november-2021).

8 Consultation

Public consultation was undertaken using an online survey, via the Department of Health’s Citizen Space platform⁴⁷. The consultation was open from 30 September 2022 to 11 November 2022 (6 weeks).

In addition, an industry reference group was convened by the Mental Health Commission and two videoconferences (30 September 2022 and 18 October 2022) were held, at which the proposed supply controls were discussed.

The industry reference group included representatives from businesses that:

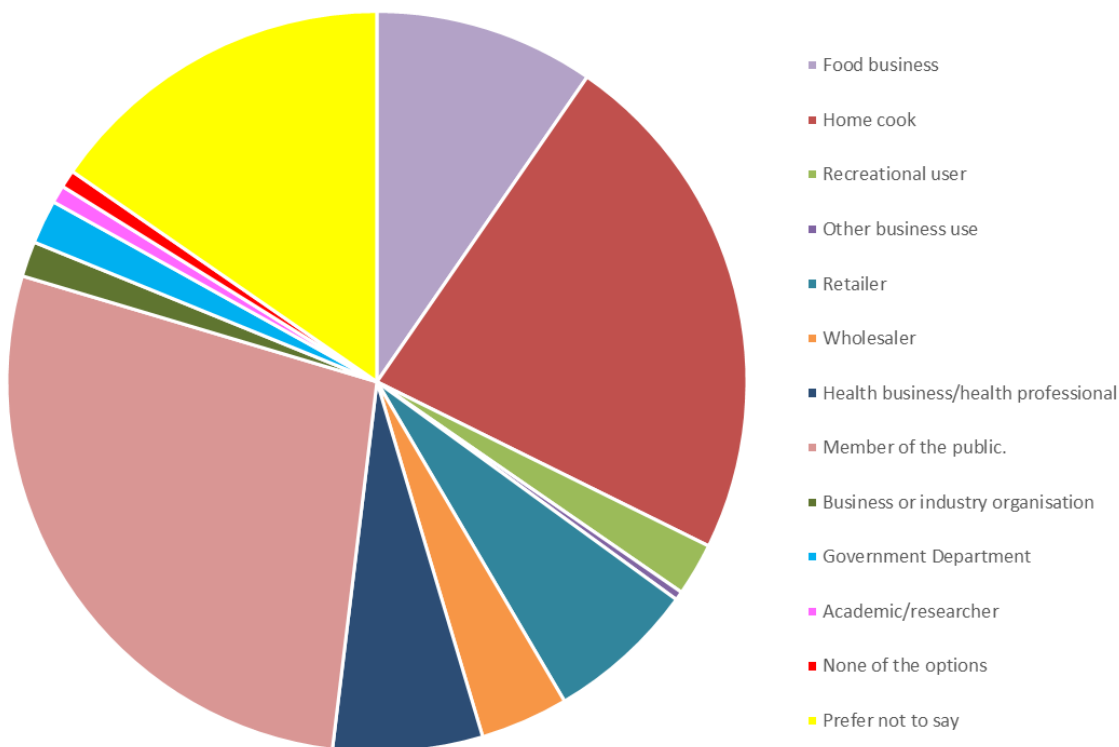
- supply nitrous oxide by wholesale,
- supply nitrous oxide by retail and
- use nitrous oxide in hospitality venues such as restaurants, cafes and bars.

8.1 Public consultation survey respondent demographics

There were 260 responses to the consultation survey. Questions asked in the survey are shown in Appendix 1.

The majority of responses (85%) were from individuals, with 39 (15%) from an organisation or business.

Figure 2: Respondent type (one option only per respondent)



⁴⁷ Available at: <https://consultation.health.wa.gov.au/medicines-and-poisons-regulation-branch/regulation-of-nitrous-oxide-supply/>

Note: A number of text-based comments made by individuals in the group identifying as using nitrous oxide as a 'home cook' were suggestive of these people also using nitrous oxide as an intoxicant.

8.2 Proposal to limit purchase quantity for individuals and non-food businesses

219 (84.2%) of survey respondents disagreed or strongly disagreed with this proposal. However, there was significant variation between respondent types as shown in Table 1.

Table 1: Responses by responder type for 10 bulb purchase limit

Type of respondent	Strongly disagree or disagree	Neither agree nor disagree	Agree or strongly agree
Food businesses	92%	4%	4%
Home cooks, recreational users and other members of the public	92%	0.7%	7.3%
Wholesalers	50%	0%	50%
Retailers	82.4%	0%	17.6%
Health professionals and health related businesses/organisations	17.7%	0%	82.3%
Government department	0%	0%	100%
Prefer not to say	97.5%	0%	2.5%

The lack of support from operators and employees of food businesses may have been an indicator of failure to recognise that these purchasers would be exempted from the 10 bulb limit.

There was greater support for this restriction from the industry reference group, once it had been explained that this restriction would not apply for *bona fide* food businesses.

However, wholesalers and retailers, in particular, raised concerns about the additional work for them to check whether a person or businesses was eligible to purchase a larger amount of nitrous oxide.

Another concern raised was the difficulty in monitoring and refusing multiple transactions within a short time frame. For example, in the convenience store setting, it may be difficult for the retailer to refuse sales where members of a group attempt to each purchase a box of bulbs and the retailer suspects they intend to inhale the nitrous oxide. This is not a new issue and the Mental Health Commission already has a Volatile Substance Use Retailer's kit available on their website⁴⁸. This kit includes posters for display in the retail premises and an information booklet for retail staff. Nitrous oxide is included as a volatile substance within these materials.

The risk of a person buying a larger quantity by making multiple transactions was also provided as a reason for not implementing this type of supply restriction. Whilst it is acknowledged that

⁴⁸ Available at: <https://vsu.mhc.wa.gov.au/strategies/retailers/retailer-strategy/>

this could occur, limiting the quantity per transaction for users who are not working in a food business is still considered to be a disincentive to purchasing larger quantities of bulbs.

8.3 Proposal to prohibit sales or delivery between 10 pm and 5 am

162 (62.3%) of all respondents either disagreed or strongly disagreed with this proposal. Another 33 (12.7%) neither agreed nor disagreed and 65 (25%) agreed or strongly agreed.

As with the 10 bulb purchase limit, home cooks, recreational users and other members of the public most commonly strongly disagreed or disagreed (75.2%) with the proposal to ban overnight sales of nitrous oxide. Only 14.6% of this group agreed or strongly agreed with this proposal.

Similar to the previous proposal, there was most support from health professionals, including both organisations representing health professionals and individual health professionals. Of this group, 76.5% agreed or strongly agreed with this supply restriction.

There was general agreement by those who attended the industry reference group that this restriction would have little impact on legitimate users of nitrous oxide but could reduce purchasing behaviour associated with harmful recreational use.

8.4 Time delay between receipt and dispatch of orders

There was little overall support for this supply control with 73.5% of all respondents either disagreeing or strongly disagreeing with this proposal. The proposed supply restriction was to apply a 24-hour delay between an order being received by a wholesaler or retailer and the order being dispatched to the customer. It was not proposed this delay would apply to in-person sales.

Those identifying as home cooks, recreational users and other members of the public were least likely to support this proposed supply control, with 83.2% either disagreeing or strongly disagreeing with the proposal.

There was also a significant negative response from wholesalers and retailers of nitrous oxide, with 63.0% either disagreeing or strongly disagreeing with the proposal.

Discussion with the industry reference group determined that businesses processing orders for nitrous oxide felt this supply control would have lesser impact than prohibiting overnight supply and limiting the quantity that could be supplied but would create an unacceptable burden for these operators. Distributors of nitrous oxide believed they would need to significantly change work processes to accommodate this supply control. They indicated they would find it difficult to create two streams for order processing, based on whether the customer was a food business or not.

8.5 Limit who can purchase nitrous oxide in cylinders

Overall, 69.6% of respondents disagreed or strongly disagreed with the proposal to only allow bulbs, and not cylinders, to be supplied to individuals and end-user businesses that are not food businesses. This overall result was significantly influenced by responses from those respondents who identified as home cooks, recreational users, members of the public or who preferred not to say anything about their identity. Of this group, 83.4% either disagreed or strongly disagreed with not being able to purchase cylinders of nitrous oxide.

Health professionals, including groups representing health professionals, were generally in favour of limiting who can purchase larger cylinders of nitrous oxide, with 76.5% of this group agreeing or strongly agreeing with this supply control.

Advice from the industry reference group was that hospitality businesses use bulbs, not cylinders of nitrous oxide. In addition, reputable suppliers indicated they do not sell cylinders of nitrous oxide for food additive use and have concerns about the integrity of these products. A view was expressed that cylinders of nitrous oxide in Schedule 6 are only being imported to supply the recreational drug market.

8.6 Impact on food business operators

Almost all of those associated with food businesses claimed the supply controls would make it harder or much harder to access nitrous oxide for use as a food additive. However, other information in responses indicated these respondents had misunderstood that they would be exempted from the supply controls provided they were able to show their supplier that they were a legitimate food business.

For example, there were responses such as “limits don’t work for our business. Business accounts versus private/personal accounts should be allowed different purchasing limits”, “the limited number is an issue because I do a bulk order every few months” and “for a business that goes through anywhere between 10 and 30 cream chargers a week, these restrictions are completely unrealistic”.

Other concerns raised by food business operators who answered the survey questions were:

- the additional supply controls would increase the price of the bulbs
- it would be difficult to obtain nitrous oxide at the last minute to continue to prepare menu items using this food additive
- customer dissatisfaction and loss of business could result.

Food businesses were also asked whether they currently purchase nitrous oxide ‘in store’ or receive deliveries of nitrous oxide between 10 pm and 5 am. Sixty percent answered rarely or never to this question. However, 20% claimed to often purchase at these times.

By contrast, advice from the industry reference group was that it would be unlikely for hospitality businesses to be seeking to purchase nitrous oxide during the hours of 10 pm and 5 am.

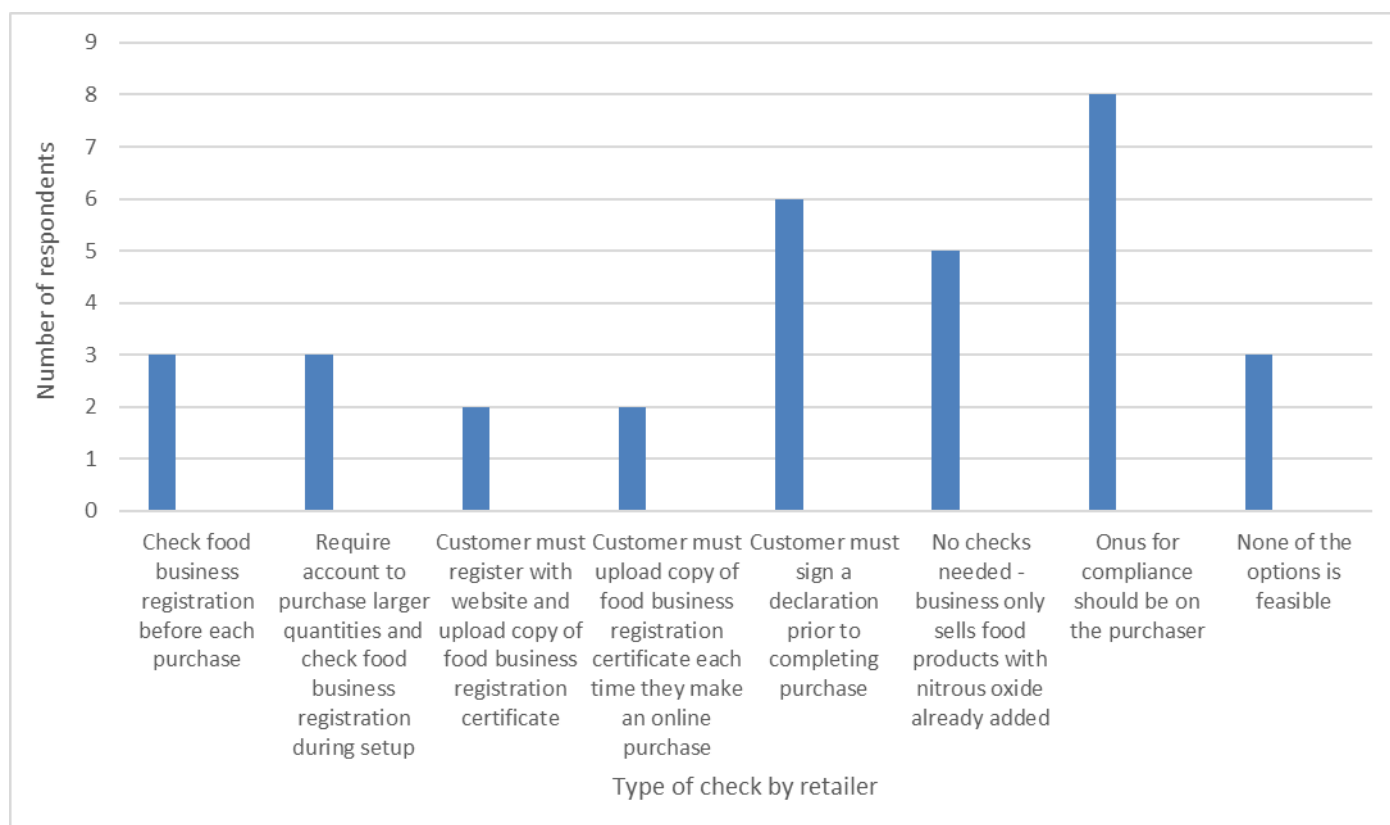
8.7 Impact on wholesalers and retailers

Consultation survey questions for suppliers focussed on the impact on their business in complying with the proposed restrictions. Suppliers were asked to choose which customer checks were feasible for their business. Respondents could choose multiple answers.

Figure 3. Wholesaler checks on customers (N = 10)



Figure 4. Retailer checks on customers (N = 17)



Suppliers were also asked how much they believed the proposed supply controls would financially impact their business, using a seven point scale.

Figure 5. Financial impact on wholesalers (N = 10)

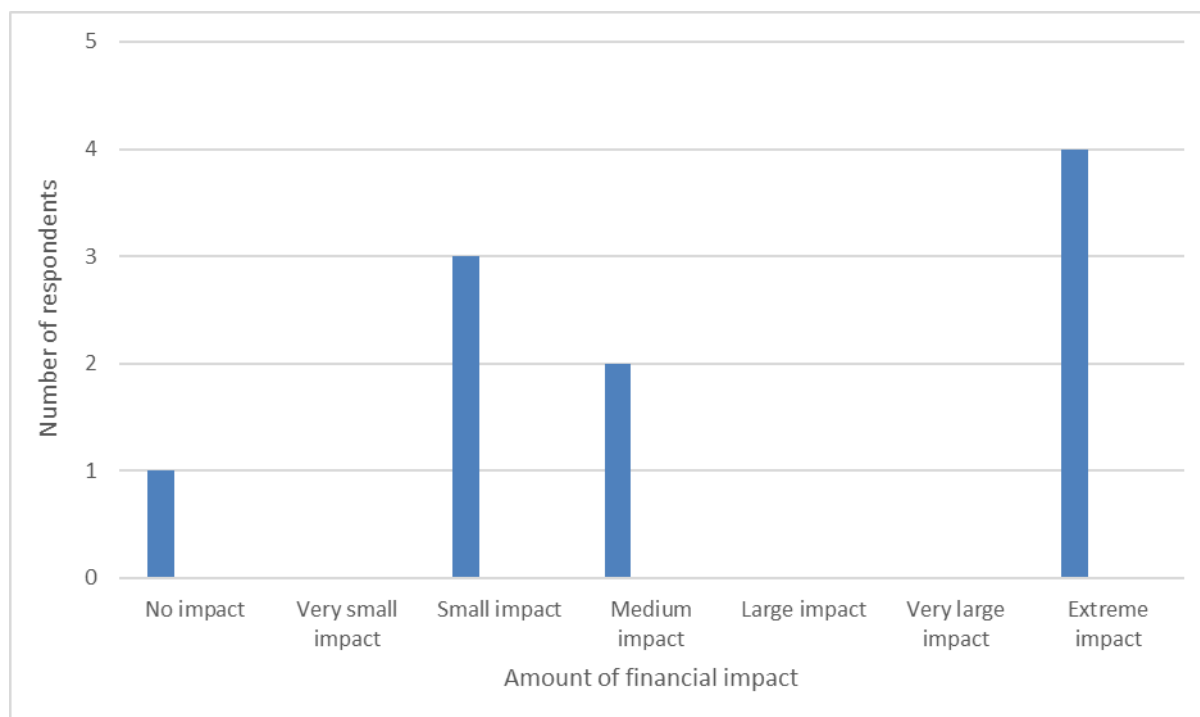
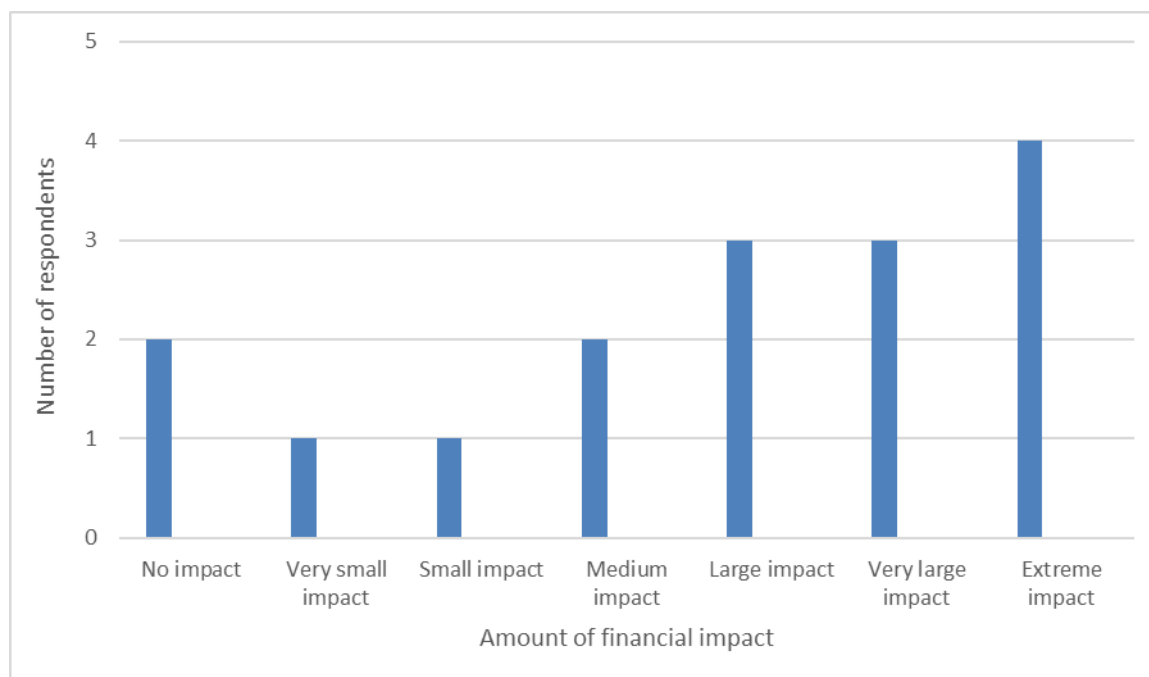


Figure 6. Financial impact on retailers (N = 17)



Organisations representing wholesalers and retailers indicated the impact on individual supply businesses would vary widely depending on factors such as whether they operate as a 'bricks and mortar' store, online only or both as well as their size, staffing, resources and customer expectations.

8.8 Other options for reducing the health harms

Around a quarter of respondents (63/260) answered the questions about other options for reducing health harms associated with nitrous oxide use as a recreational drug.

There was considerable support for education of the public about risks and harm minimisation. This is already part of the overall response to the issue of harmful use patterns for recreational nitrous oxide. The Mental Health Commission is currently developing information and education resources for suppliers, users and health professionals.

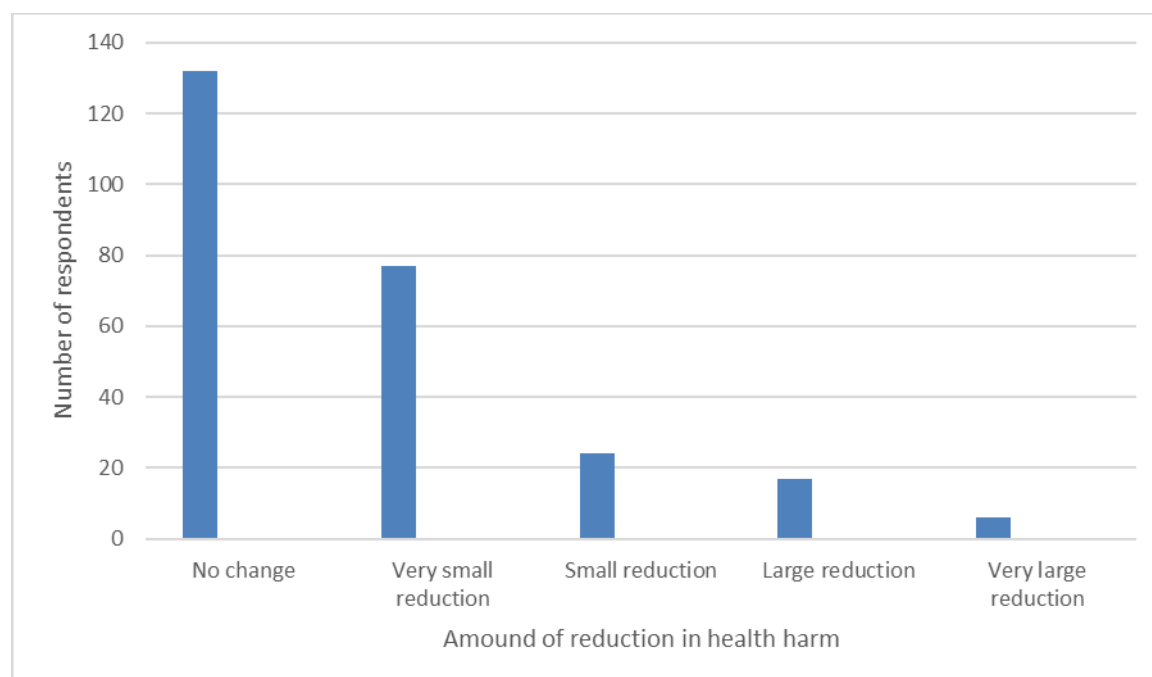
Other options of a regulatory nature that were suggested by survey respondents included:

- Ban online sales
- Do not allow sales to children
- Prosecute those who sell for recreational use
- Require a valid ID document for purchase, such as a driving licence
- Record sales
- Require business to provide their Australian Business Number (ABN) before completing sale
- Ban larger cylinders because these are not use for food preparation
- Store behind the counter
- Prohibit promotion of 'nangs'
- Prohibit the misuse rather than restricting supply.

8.9 Impact of proposed supply restrictions on health harm

All respondents were asked for their opinion on whether the proposed supply controls would have an effect on reducing health harm associated with recreational use of nitrous oxide.

Figure 7. Expected reduction in health harm



However, there was variation across the different demographic groups in relation to the impact of the proposed supply controls. A greater proportion of health professionals believed there would be a positive impact compared to non-business users of nitrous oxide and members of the public more generally.

The wording of the question may have influenced the responses. The question asked was "How much do you think the proposed supply controls will reduce health harm related to recreational use of nitrous oxide?". Responses may have been influenced by whether the respondent

answered from the perspective of harm to an individual who still chose to use nitrous oxide compared to health harm to the population more broadly.

One respondent suggested there was “strong anecdotal link between the use of nangs and antisocial behaviour”.

Another respondent stated there was evidence of reduced numbers of calls from South Australia to Poisons Information Centres following the introduction of supply controls in that state and that this was an indicator of reduced harm.

8.10 Other comments

There were concerns expressed by the industry reference group that some businesses with liquor licences, such as small bars and taverns, which use nitrous oxide as a food additive in preparing drinks, may not be registered as food businesses. Although these businesses may not need to be registered under the Food Act, they would be required to notify local government under the Food Act if they were only selling packaged food such as chips (crisps). However, whilst a registered food business will always have a certificate of registration, which they can provide to their nitrous oxide supplier, this may not always be the case for businesses for which notification under the Food Act is applicable.

Littering of used bulbs was raised as an issue, particularly by local government. It was stated that used bulbs are frequently littered in large quantities in car parks, public gardens and other public spaces maintained by local government, posing a risk to environmental health and community amenity. This places additional pressures on local government resourcing, given the expectation to clean up discarded bulbs in public places.

Forty respondents (15.4%) answered the ‘other comments’ question in the online survey.

Some respondents commented on the regulation of the misuse of substances more generally, with a number of comments relating to the perceived failure of prohibition as a response to substance misuse and an expectation that regulatory controls over supply would result in a ‘black market’ for nitrous oxide. There were claims a ‘black market’ would then result in sub-standard product becoming available and risk of greater harm for users. One respondent suggested that those selling nitrous oxide as ‘nangs’ are already importing cream chargers from unregulated source markets and working in a clandestine manner.

Concerns were also raised about the risk of diverting users to more harmful substances.

9 Final outcomes

Primary considerations in selecting the final supply restrictions were as follows:

- Promoting less harmful purchasing behaviour for recreational use of nitrous oxide
- Maintaining access for legitimate use of nitrous oxide as a food additive, particularly when preparing food and drinks in the hospitality industry
- Recommendations of the expert working group
- Consultation feedback from the public consultation and the industry reference group
- Subsequent internal WA Government engagement and consultation.

The following supply controls have been accepted for implementation through amendments to the Medicines and Poisons Regulations 2016:

1. Supply not permitted of nitrous oxide in Schedule 6 for domestic use, except where the nitrous oxide has been denatured with sulfur dioxide.
2. Supply not permitted of larger cylinders, except where the nitrous oxide has been denatured with sulfur dioxide.

3. Supply permitted of nitrous oxide that has been denatured with sulfur dioxide, and in accordance with requirements for substances in Schedule 6.
4. Supply permitted of nitrous oxide bulbs to businesses that are registered or notified as food businesses under the *Food Act 2008*.
5. Supply permitted of nitrous oxide bulbs to businesses that hold certain types of liquor licences under the *Liquor Control Act 1988*, for use in the preparation of drinks at the premises or location to which the licence pertains.
6. Supply permitted, when approved by the CEO of Health, for individual users, for purposes that do not pose a risk to human health and welfare.

10 Monitoring of supply control impacts

The main aim of the proposed supply controls is to change purchasing patterns in a manner that reduces the incidence of the serious adverse health outcomes being experienced by recreational users of nitrous oxide. It is therefore considered appropriate to monitor parameters which may indicate lower levels of recreational use and lower levels of health harm linked to use of nitrous oxide for the purpose of intoxication.

Although likely influenced by multiple factors, review of the number of people presenting to WA public hospital emergency departments with nitrous oxide associated neurological conditions can be used as an indicator of the effectiveness of the proposed supply controls. Other surrogate measures of reduced health harm would be reduced numbers of calls to the WA Poisons Information Centre about nitrous oxide and reduced numbers of calls to the Alcohol and Drug Support Line.

Whilst there are no mandatory record keeping requirements for wholesalers or retailers when supplying S6 poisons, some records are likely to be kept as part of usual business practices. Audits of computerised 'point of sale' or other records of supply by wholesalers and retailers can be used to provide evidence of adherence to limits on quantity and product type supplied.

Changes to the availability of nitrous oxide 'nangs' from online businesses, especially those located in WA or claiming to supply to WA, could also be used to assess the impact of any regulatory changes. Review of information provided to potential clients by these businesses, via their websites, would be an indicator of their awareness of the changes. Test purchases could be made to check whether these businesses are adhering to the regulatory requirements.

Other information which could indicate an effect of the proposed supply controls would be changes in reports from local government authorities of littering due to discarded/used cream chargers.

There may also be an opportunity to include pertinent questions in future EDRS surveys to assess whether participants have noticed changes in availability or whether they have changed their purchasing behaviour.

Appendix 1 Public Consultation Survey Questions

Please provide your opinion for each of the options for controlling supply of nitrous oxide to individuals and end-user businesses that are not food businesses.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Maximum of 10 bulbs (1 box) per transaction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
No sales or deliveries between 10 pm and 5 am.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24 hour delay between order placement and dispatch.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Only bulbs can be purchased, not cylinders.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

About you

To help us understand your responses better, please answer the following questions.

How would you like your submission to be treated?

(Required)

Please select only one item

- Publish my submission with my name and/or organisation.
- Publish my submission anonymously.
- Do not publish my submission (confidential submission).

What is your name?

Name _____

Your name will not be published, unless you have chosen to have your submission published with your name and/or organisation details. The Department will not provide your name to third parties.

What is your email address?

Email _____

If you provide an email address, you will be sent a link to a .pdf of your survey responses.

In this survey, are you providing your own individual views or the official views of an organisation or business?

(Required)

Please select only one item

- My own views.
- The views of an organisation or business.

If you are responding on behalf of an organisation or business, please provide the name and contact details:

Name of organisation or business

Address and other contact details

Which ONE of the following options BEST describes you?

(Required)

- Food business operator or employee that uses nitrous oxide.
- Someone who uses nitrous oxide in home cooking, but does NOT operate a food business.
- Business, organisation or individual that uses nitrous oxide (with added sulfur dioxide) for automotive purposes.
- Someone who uses nitrous oxide recreationally.
- Business, organisation or individual that uses nitrous oxide for another purpose, not otherwise listed.
- Retail business operator or employee that sells nitrous oxide to end users.
- Wholesale business operator or employee that sells nitrous oxide (includes a wholesale business with a retail arm).
- Health professional.
- Health-related business or organisation, including patient support organisations.
- Member of the public.
- Consumer organisation.
- Business or industry organisation.
- Government Department.
- Academic or researcher at a tertiary institution or other research facility.
- None of the options describe me.
- Prefer not to say.

If you don't think any options describe you, please describe yourself below:

(Required)

Questions for food businesses

These questions are to help us better understand the impact of the proposed supply controls on food businesses.

Please choose ONE option that best describes the type of food business you operate or work in:

- Hotel, cafe or restaurant that uses nitrous oxide in food preparation.
- Catering business (NOT home-based) that uses nitrous oxide in food preparation.
- Home-based food business that uses nitrous oxide in food preparation.
- Food manufacturing business that uses nitrous oxide as a food additive.
- Other type of food business, not described in the previous options, that uses nitrous oxide.
- Prefer not to say

Do you think the additional supply controls will make it easier or harder for your food business to access nitrous oxide?

Please select only one item

- Much harder Harder No change expected Easier Much easier

Does your business currently purchase 'in store' or have nitrous oxide delivered, between 10 pm and 5 am?

- Very often Often Sometimes Rarely Never

Please describe any effects you think the proposed supply controls will have on your business, in the box below:

Questions for wholesalers

These questions are to help us better understand the impact of the proposed supply controls on wholesalers who supply nitrous oxide products.

Choose which of the following types of customer your business supplies: Please select all that apply

- Other wholesalers and/or manufacturers.
- Retail businesses that on-sell nitrous oxide products to end users.
- Food businesses, such as hotels, cafes, restaurants and caterers.
- Other types of end-user business (that are not food businesses).
- Members of the public.
- None of the options describe my customers.

Prefer not to say.

Which of the following checks would be feasible for your business, to ensure you only sell larger quantities of nitrous oxide to food businesses? Please select all that apply

- Check your customer has a current Certificate of Registration as a food business when they first set up their account.
- Check your customer has a current Certificate of Registration as a food business annually.
- Check your customer has a Certificate of Registration as a food business each time they make a purchase, even when they have an account.
- Require a new customer to make a signed declaration that they are a food business but do not require them to show their Certificate of Registration as a food business.
- My business only sells food products that already have nitrous oxide added to them, such as cans of aerosol whipped cream.
- My business should not have to do any checks - the onus should be on the purchaser to only order cylinders or larger quantities of bulbs if they are a registered food business.
- None of the above options are feasible for my business.

How much do you think the proposed supply restrictions on nitrous oxide will financially impact your business?

When determining the financial impact on your business, please consider compliance costs (such as checking whether a purchaser is a food business) and costs associated with potential changes in inventory and sales volumes.

- No impact
- Very small impact
- Small impact
- Medium impact
- Large impact
- Very large impact
- Extreme impact

Questions for retailers

These questions are to help us better understand the impact of the proposed supply controls on retailers, who supply nitrous oxide products to end users.

Please choose ONE option that best describes your retail business:

- Convenience store
- Supermarket
- Petrol station store

- Online only supplier
- Other retail supplier without an online store
- Other retail supplier with both 'bricks and mortar' store and online store.
- None of the options describes the retail business
- Prefer not to say

Which of the following checks would be feasible for your business to ensure you only supply larger quantities of nitrous oxide to food businesses?

Please select all that apply

- Check your customer has a current Certificate of Registration as a food business each time they make a purchase.
- Require your customer to set up an account if they wish to purchase a larger quantity of nitrous oxide and check their Certificate of Registration as a food business as part of the account set up process.
- Require your customer to register with your website before they can make a larger purchase of nitrous oxide and require them to upload a scan or photo of their Certificate of Registration as a food business at that time.
- Require your customer to upload a scan or photo of their Certificate of Registration as a food business each time they make an online purchase of a larger quantity of nitrous oxide.
- When a purchaser tries to make a purchase of a larger quantity of nitrous oxide, ask them to make a signed declaration that they are a food business but do not require them to show their Certificate of Registration as a food business.
- Restrict all customers to only purchasing 10 bulbs of nitrous oxide per transaction.
- No checks will be necessary as the business only sells food with nitrous oxide already added, such as cans of aerosol whipped cream.
- My business should not have to do any checks - the onus should be on the purchaser to only order cylinders or larger quantities of bulbs if they are a registered food business.
- None of the above options are feasible for my business.

How much do you think the proposed supply restrictions on nitrous oxide will financially impact your business?

When determining the financial impact on your business, please consider compliance costs (such as checking whether a purchaser is a food business) and costs associated with potential changes in inventory and sales volumes.

- No impact
- Very small impact
- Small impact
- Medium impact
- Large impact

- Very large impact
- Extreme impact

Questions for health professionals and health related businesses/organisations

Please choose ONE option that best describes your health profession or health organisation/business type:

- Registered health practitioner
- Registered health practitioner who primarily works in the Alcohol and Other Drugs (AOD) sector
- Health professional who is not AHPRA registered and who works in the AOD sector
- Health professional who is not AHPRA registered and who does not work in the AOD sector
- AOD sector healthcare provider/business, that provides care to individual patients/clients
- Healthcare provider/business that provides care for individual patients/clients, but not primarily in the AOD sector.
- Other type of health-related business
- Health profession member organisation
- Patient support organisation
- Other type of health organisation, not otherwise listed

Final questions (all respondents)

Please choose how much OVERALL impact the proposed supply controls will have for you (or your business or organisation if you are answering on their behalf): Please select only one item

- No impact
- Very small impact
- Small impact
- Medium impact
- Large impact
- Very large impact
- Extreme impact

How much do you think the proposed supply controls will reduce health harm related to recreational use of nitrous oxide? Please select only one item

- No reduction
- Very small reduction
- Small reduction
- Large reduction

Very large reduction

If you have other ideas about how to reduce the health harms associated with recreational use of nitrous oxide, please provide details in the box below:

If you have any other comments, please provide details in the box below:

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