Global Health Qualitative Research Study Protocol

Rapid ethnography of alcohol production, distribution, and consumption and methanol poisoning in Bangladesh

Sponsor	The University of Edinburgh ACCORD The Queen's Medical Research Institute 47 Little France Crescent Edinburgh EH16 4TJ
Protocol authors	Dr Janet Perkins Prof Alice Street Dr Fazle Rabbi Chowdhury Dr Jane Brandt Sørensen Dr Knut Erik Hovda Prof Michael Eddleston
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CONTENTS

LIST OF ABBREVIATIONS

CEI	Community Engagement and Involvement
DGHS	Directorate General of Health Services
FGD	Focus Group Discussions
HIC	High Income Countries
LMIC	Low- and Middle-Income Country
MOHFW	Ministry of Health and Family Welfare
PIS	Participant Information Sheet
POCT	Point-of-care test
RUET	Rajshahi University of Engineering and Technology
TSB	Toxicology Society of Bangladesh
WHO	World Health Organization

1 INTRODUCTION

1.1 BACKGROUND

Methanol (methyl alcohol) differs from ethanol (ethyl alcohol), the principal chemical found in alcoholic beverages[1], in only a minor reconfiguration of the chemical structure and the presence of one, rather than two, hydrogen atoms (Jones, 2021). Methanol is in itself non-toxic. However, while both methanol and ethanol are easily metabolized in the body by the same enzyme in the liver, the end product of methanol, formic acid or formate, will accumulate and resulting in toxic effects in the form of cell death (Jacobsen and McMartin, 1986). Therefore, while the human body generally manages ethanol unproblematically, and ethanol-containing drinks are the most widely used psychotropic substances worldwide (Dietler, 2006, Hockings and Dunbar, 2019b), even small amounts of methanol operate as a poison when introduced into the body, permanently impairing health and threatening life (Jones, 2021, Tian et al., 2022). Globally, methanol poisoning is understood to be on the rise, with permanent impairment and mortality localised primarily in low- and middle-income countries (LMICs), where access to diagnostics and treatment for methanol poisoning are scarce (Zyoud et al., 2015).

Methanol poisoning occurs almost exclusively through the ingestion of beverages contaminated with the compound under the guise of ethylated spirits. Since methanol is cheaper to produce and mixes well into ethanol without any visible signs of contamination, it is used to either add intensity to alcoholic drinks or to fabricate alcoholic drinks where such drinks are difficult to come by (Jones, 2021). As a moment of supply chain disruption, the COVID-19 pandemic brought occurrences of methanol poisoning to light. This included instances in which people represented as ‘alcoholics’ turned to consumption of hand sanitizers made with methanol in the absence of alcoholic beverage supply in the USA and Australia (Krebs and Czarnecki, 2022, Dear et al., 2020) and a series of outbreaks of methanol poisoning in Iran (Arasteh et al., 2020, Adibi et al., 2020, Delirrad and Mohammadi, 2020, Soltaninejad, 2020). Yet, while perhaps exacerbated by the pandemic, methanol poisoning is a longstanding issue across the globe (Rostrup et al., 2016, Zyoud et al., 2015), including throughout South Asia (Shafi et al., 2016, Vaibhav et al., 2022, Amin et al., 2017, Shah et al., 2012) where this study is based.

Effective treatment for methanol poisoning exists, and if initiated early before the patient becomes critically ill, most resulting deaths and disability can be averted. The most important treatment for methanol poisoning is the administration of fomepizole, a drug that was added to the 18th WHO Model List of Essential Medicines in 2013 (WHO, 2013), followed by buffer, dialysis, and folic acid treatment. It can also be treated through administration of ethanol where fomepizole is unavailable. Unfortunately, diagnosis currently requires tests carried out in a laboratory. In many

[1] Throughout this document, we will use the term ‘alcohol’ to refer to ethanol-based fermented liquids that are either commercially produced or home brewed (Hunt and Barker, 2001).

LMICs, the required assays are not available and therefore the diagnosis is often not considered, unless there is an obvious outbreak ongoing, allowing diagnosis to be made on clinical grounds alone. Where the diagnosis is considered, initiation of treatment—even if available—is often delayed. By the time a diagnosis is achieved, physical impairment and death resulting from treatment delays have already occurred (Jones, 2021, Vaibhav et al., 2022).

This study is based in Bangladesh, where methanol poisoning has been reported across a number of geographic areas (Amin et al., 2017, Dewan and Chowdhury, 2015, Uddin et al., 2022). The situation of methanol poisoning in Bangladesh is complicated by the socio-political conditions, in which alcohol consumption is both legally and ethically proscribed (Islam et al., 2017, Dewan and Chowdhury, 2015). While prohibition of alcohol is common in many Muslim-majority settings, alcohol consumption in Bangladesh is considered exceptionally low even among such countries (WHO, 2019). The low social acceptance of alcohol in the country may contribute not only to the risk of non-licensed production and consumption of contaminated drinks, but also to hesitant care seeking and slow diagnosis and treatment for those affected by methanol poisoning.

Against this backdrop, fast tracking methanol poisoning diagnosis is a priority. A point-of-care test (POCT) may offer a promising tool to detect methanol poisoning quickly at the health facility and thereby short-cut time to treatment initiation, ultimately averting disability and death. If fully implemented into clinical practice, it could also enable the early identification of victims through deployment to the origin of an outbreak, and thereby facilitate the testing and identification of other victims even before the onset of symptoms. This could have an important preventive effect, as it could alert friends, families, and other living nearby that toxic alcohol in present in the vicinity. As POCTs do not depend on laboratory infrastructure or electricity, they are presumably adaptable to a variety of conditions and settings. Colleagues involved in the umbrella NIHR RIGHT4 project have developed such a test, which will be tested in medical colleges across Bangladesh to assess its clinical efficacy.

Critical social science scholarship has shown that while “simple” technologies such as POCT devices are often championed as providing a standalone solution, they, in fact, depend on and are shaped by the social and cultural systems in which they are integrated (Perkins et al., forthcoming). To understand whether a new POCT device for methanol poisoning would be acceptable to communities in Bangladesh, and how it might be effectively implemented, research into the social relationships and cultural values associated with alcohol consumption and methanol poisoning in Bangladesh is required. There is very little existing evidence on this topic—a significant knowledge gap that this study seeks to address. They generated knowledge will lay the groundwork for the integration of the POCT for detecting methanol poisoning in Bangladesh.

1.2 RATIONALE FOR STUDY

This study will consist of a rapid ethnography to illuminate the social and cultural context of alcohol production, distribution, and use in Bangladesh and to better understand community level drivers and responses to methanol poisoning. The findings will be used to design a socially informed approach to introduce and test a POCT to detect and accelerate treatment of individuals experiencing methanol poisoning. Community engagement and involvement (CEI) will be prioritized over the course of the study, to ensure acceptance of the study, allow community members to shape the study process and outcomes, and inform longer-term strategies of community engagement in relation to this sensitive topic.

1.2.1 Alcohol consumption in Bangladesh

Methanol poisoning in Bangladesh occurs primarily when individuals consume presumed alcoholic beverages contaminated with methyl alcohol. It is therefore critical to understand the broader context of alcohol in Bangladesh to make sense of methanol poisoning. This is a topic that remains little explored, as least in part due to perceptions of alcohol consumption in the county as marginal. Indeed, by global standards, alcohol consumption in Bangladesh is quite exceptional; the country is reported by the World Health Organization (WHO) as among only a handful in which alcohol consumption is near zero (WHO, 2019). The WHO Global Status Report on Alcohol and Health 2018 report indicated that 98% (96.5% of men and 99% of women) of the Bangladeshi population abstained from alcohol consumption over the past year, and 92.5% of the population are lifelong abstainers (90% of men and 96% of women) (WHO, 2019). While epidemiological data related to alcohol consumption is notoriously difficult to gather and underreporting of consumption is systematic across contexts (Heath, 2012, pp. 10, 165-67), consistency across sources suggests that alcohol consumption in Bangladesh is relatively rare, even compared to other majority-Muslim countries. However, studies have also demonstrated a proportionally high level of "problem" drinking among those who do consume alcohol in the country (Dewan and Chowdhury, 2015, Islam et al., 2017).

The low levels of alcohol use may be explained in part by the prohibitive politico-legal stance toward alcohol in the country. Alcohol production and consumption have a long history throughout the sub-continent, pre-dating colonization under the British, but both were exacerbated and shaped by it (Wald, 2018, Goodman, 2020, Bhattacharya, 2017, Mahato, 2022). When Bangladesh secured its independence from Pakistan in 1971, its founders imagined it as a (near) teetotaling nation, made explicit in the constitution.[2] However, while alcohol was explicitly prohibited for Muslims,

[2] Alcohol use is addressed in clause 18.1 of the Constitution under the heading "Public Health and Morality". It reads: *The state shall regard the raising of nutrition and public health among its primary duties, and in particular, shall adopt effective measures to prevent consumption, except for medical purposes or other purposes as may be prescribed by*

composing approximately 90% of the country's population (Hackett et al., 2015), the appeal to curtailing alcohol was justified in the interest of public health rather than religion (People's Republic of Bangladesh, 1972), contrary to other Muslim-majority countries (Matthee, 2023).

Formal measures to curtail alcohol use in the country are guided by the Narcotics Control Act (NCA) (Department of Narcotics Control, 1990, Department of Narcotics Control, 2020 [2018]), which sets the terms of strict licensing measures related to alcohol production, distribution, and consumption. According to the NCA, foreign nationals and non-Muslim Bangladeshis having obtained a license are permitted to consume alcohol in licensed venues or in their homes. Muslim Bangladeshis, in contrast, are only permitted to consume alcohol based on medical indication confirmed by a medical doctor and district medical authority (civil surgeon) or a medical professor. While there is no specification regarding what medical indications may be justifiable (Dewan and Chowdhury, 2015), this may reflect a legacy of therapeutic uses of alcohol under colonisation (Goodman, 2018, Bhattacharya, 2017). Unlicensed consumption of alcohol is punishable by fine and 2-10 years of imprisonment (Department of Narcotics Control, 2020 [2018]).

Production of alcohol is similarly strictly regulated, and today only two breweries are authorized to produce alcohol beverages in the country. The first, Carew & Co. was founded in 1897 by Rober Russel Carew in British-colonized India and established a distillery in 1938 in Darshana, located within the borders of modern-day Bangladesh. After partition in 1947, the Pakistani government took over the distillery as Carew & Co. (Pakistan) Limited. Following Bangladeshi independence in 1971, it became Carew & Co. (Bangladesh) Limited and was nationalised in 1973. The distillery processes sugarcane to produce sugar, and while this arm of the business has been loss making for 79 of the 83 of its functioning years, its byproducts are used to produce profit-generating commodities, including alcoholic beverages and alcohol for the chemical industry (Shohag, 2012).

In 2003, the national monopoly on commercial alcohol production of Carew & Co. unravelled when Jamuna Distillery Limited, operating under the Jamuna Group conglomerate, was the second brewery granted a licence to produce alcohol, and first (and to-date only) private brewery. New regulations related to alcohol production and distribution were introduced in 2022, setting thresholds for procurement at 40% from foreign suppliers and 60% from domestic to support local suppliers, and relaxing requirements for restaurants and bars to obtain permits to serve alcohol (Islam, 2022). While these habe been interpreted by some as an overall relaxation of alcohol consumption rules (Woods, 2022), they are perhaps better explained by the governments desire to support profit-generation through domestic production of

law, of alcohol and other intoxicating drinks and drugs which may be injurious to health." This clause commits the state to put into place measures to prevent the consumption of alcohol within the country..

alcohol, bolster tax revenues through excise tax on alcohol distributed primarily to a market of foreign nationals, and to attract foreign tourists (Woods, 2022). Indeed, tax revenues gained through excise taxes levied on alcoholic beverages have long been a crucial source of income for states, even in Muslim-majority countries (Matthee, 2014).

However, while alcohol consumption among Bangladeshis remains exceptional, there is some indication that alcohol use is on the rise (Dewan and Chowdhury, 2015). While some studies have sought to understand the extent of alcohol consumption in Bangladesh (Dewan and Chowdhury, 2015, Islam et al., 2017), there is a paucity of scholarly engagement with the social context of alcohol use in the country. Moreover, the existing evidence-base takes an exclusively public-health oriented stance regarding the consumption of alcohol, which overwhelmingly frames it as a public health concern rather than a social and cultural practice.

Public health narratives tend to approach alcohol consumption from a "problem" perspective, locating drinking problems as stemming from individual behaviours (Marshall et al., 2001, Bennett and Cook, 1996). While much of the public health research throughout the decades has tried to disentangle "normal" drinking from "problem" drinking, and thereby design policy and intervention responses based on these categories (Bennett and Cook, 1996), an abstinence approach has recently gained traction. This is reflected, for example, in the 2018 Lancet publication reporting that no level of alcohol consumption improves health (Burton and Sheron, 2018), which has become the official position of WHO (WHO, 2023).

In contrast to public health approaches, anthropological scholarship has attempted to approach alcohol production, distribution, consumption as an inherently social and exceptionally widespread phenomenon (Hockings and Dunbar, 2019b, Heath, 2012, Hunt and Barker, 2001). Indeed, archaeological evidence suggests that since that point in human evolution at which the human body evolved to metabolise ethanol, no society with the capacity to produce ethanol-containing beverages has opted not to (Hockings and Dunbar, 2019a), and alcohol production and consumption, even when proscribed, has always been socially and culturally valorised (Heath, 2012, Mandelbaum, 1965, Dietler, 2006). As David Mandelbaum phrased it in 1965, "There have been very few, if any, societies whose people knew the use of alcohol, yet paid little attention to it. Alcohol may be tabooed; it is not ignored" (Mandelbaum, 1965).

As one of many forms of consumption of food, beverages, and other psychotropic substances, anthropologists recognise alcohol consumption as both reflecting and constituting social worlds (Dietler, 2006, Douglas, 2013 [1987], Heath, 2012, Withington and McShane, 2014, Russell, 2019). While alcohol, in its ubiquity, was often encountered and engaged with peripherally in early anthropological scholarship, it was during the 1970s and 1980s that an anthropology of alcohol was consolidated (Heath, 1975, Heath, 1987).Throughout the 1980s, much of this work was carried out

by medical anthropologists in the United States, and often as an appendage to epidemiological and public health studies on alcohol (Bennett and Cook, 1996). Some of this anthropological work was applied, while others challenged popular strands of thought related to alcohol, such as the "disease model" of alcohol abuse (Bennett and Cook, 1996). In the 2000s, anthropological interest in alcohol has continued, moving beyond functionalist interpretations and analyses of how alcohol reflects society and culture, to considerations of alcohol *as* material culture and how social contexts are constituted through the production, distribution and consumption of alcohol (Dietler, 2006, Hockings and Dunbar, 2019b).

However, this scholarship has been reticent to examine alcohol in predominantly Muslim societies, and, in such contexts, has tended to approach alcohol consumption as an aberration and peripheral to society (see i.e., Heath, 2012). Such perspectives fail to account for rich traditions of alcohol production and consumption across the Muslim world. Indeed, the English word 'alcohol' traces its etymology to the Arabic word *al-kuhl*, and the innovation of distillation of alcohol is credited to the Persians (Matthee, 2023). Moreover, rather than strict abstention, scholars have noted Muslims historically demonstrating varying interpretations of the injunction against consumption of alcohol, and within some Islamic schools of thought, such as Sufism, the celebration of the consumption of wine (Arab, 2022, Matthee, 2023).

Variation is also observed across private and public alcohol-related practices in Muslim contexts, and the role of alcohol in the political economies of predominantly Muslim countries. For example, in juxtaposing the emphatic proscription against alcohol with its widespread presence and consumption within such societies, historian Rudi Matthee suggests that "the paradox, then, is that alcohol is integral to the constitution of Muslim culture as much by its 'absence' as by its presence, putting it at the centre of Islam, making it almost its defining issue" (Matthee, 2023, Introduction, p. 3). Recent anthropological scholarship has called for a more meaningful engagement with alcohol in Muslim contexts, to consider the ways in which the presence of alcohol in such societies might be considered normal rather than an aberration (Arab, 2022). Some social research has started to shed light on the social meanings of alcohol consumption across Muslim societies, for example in "postponing piety" (Debrevec, 2012), enacting resistance (Silverstein, 2012), or in creating an "ideal world" (Arab, 2022, see Douglas, 2013 [1987] for discussion on alcohol creating an "ideal world").

This study builds on these established approaches in the anthropology of alcohol to consider the production, distribution, and consumption of alcohol in Bangladesh as not only a health issue, but also as socially meaningful and shifting in value both through its 'presence' and 'absence'. It will attempt to bring the power relations entailed in alcohol production and consumption into view and elucidate the 'social lives' (Appadurai, 1988) of alcohol as it moves through different social spheres and

value regimes. It will consider alcohol consumption as not simply an aberration within a Muslim social context, but as a situated social phenomenon. This will be important for understanding the localised social meanings and values of alcohol consumption and how alcohol consumption and methanol poisoning may have unique social meanings and implications within a Muslim context.

1.2.2 Methanol poisoning

In some cases, tragically, when people engage in alcohol consumption practices, they are not consuming the chemical compound ethanol, which the human body is adept at converting and eliminating, but rather substances which the body is not equipped to manage. In such cases, this chemical compound is generally methanol.

What is methanol, and how did it come to feature as a widespread substance throughout the globe? Methanol, also known as 'wood alcohol' was first recognised as a naturally occurring chemical compound which Egyptians used for embalming. Efforts to synthesise the compound were initiated in 1610 but did not ramp up until the 1800s (Sheldon, 2017). Since then, Daniel Sheldon describes three "golden ages" in the production of methanol, largely driven by the energy industry in search for alternatives to fossil fuel-based sources of energy. Methanol production has been equally important for the chemical industry, featuring as a common component of multiple chemicals products, including windshield washer fluid, gas line antifreeze, carburettor cleaner, copy machine fluid, and perfumes (Ashurst and Nappe, 2018). Given the array of uses to which methanol has been put, it is perhaps unsurprising that its use today is near ubiquitous. In recent years, methanol production has increased, and enthusiasm around it is unlikely to dissipate, as in some circles is it now seen as a possible key to a carbon neutral future (Sethi, 2022).

Outside the human body, methanol is not particularly dangerous. However, inside the body, it is rapidly absorbed into the bloodstream, where it is converted into formic acid, a toxic metabolite (Ashurst and Nappe, 2018). Formic acid interferers with all cells in the body, and is thought to be most toxic to cells of higher energy consumption, including parts of the brain such as the basal ganglia and visual paths. The optic nerves, for example, are particularly susceptible to the effects of formic acid, leading to visual impairment, sometimes to the point of blindness (Mousavi Roknabadi et al., 2021). Formic acid also disrupts the acid base in the body, leading to metabolic acidosis and respiratory failure which can result in death (Jones, 2021).

While some accidental ingestion of methanol has been documented, for example in young children who unwittingly consume chemical products containing methanol (Ashurst and Nappe, 2018), most methanol poisoning events involve some degree of intentionality. In some cases, this may be intentional ingestion of methanol, for example among "alcoholics" looking for a substitute for ethanol when access to pure alcoholic drinks is curtailed (Krebs and Czarnecki, 2022). More commonly, the

person consuming the methanol-contaminated beverage is intending to drink to an alcoholic drink but is unable to distinguish between methanol and ethanol containing beverages, and the intentionality rests with those involved in preparing the concoctions. This is generally done to increase the intoxicating effects of alcohol drinks by adding methanol or create imposter alcoholic drinks (Jones, 2021), particularly in contexts such as Bangladesh where legal channels of sourcing alcoholic drinks are sparse.

While methanol poisoning events have received a high degree of media coverage in neighbouring India, such reports are relatively uncommon in Bangladesh. This may at least be due to the more restrictive legal and ethical context of alcohol use in Bangladesh, and therefore a reticence to report alcohol related events. Still, several such incidents have been reported in Dhaka (Amin et al., 2017), Bogora (Prothom Alo English Desk, 2021), Rajshahi (Uddin et al., 2022), Rangpur, and Dinajpur (Prothom Alo English Desk, 2020). These reports suggest that these events tend to result from social events (festivals and others) during which groups of men engage in drinking practices together, resulting in "outbreaks" of "toxic alcohol" induced malady.

On 24 April 2023, Prothome Alo, a national newspaper, reported on a "toxic alcohol" event in Kushtia, located along the western border with India. According to the report, four men fell ill and subsequently died after drinking toxic alcohol around the time of Eid El-Fitr (UNB, 2023). Our research team has connections Kushtia district and reached out to community member and the district hospital management to take a pulse of responses to this event. These initial discussions with the community and district hospital staff suggest a willingness of people to discuss it. This study will therefore launch from this event in Kushtia to explore these issues to untangle the social context of methanol poisoning in Bangladesh. It will illuminate perceptions of methanol poisoning, conceptualisations of the causes of and responsibilities around methanol poisoning events, and individual, social and health system responses to "toxic alcohol". The premise of this research is that understanding the social and cultural meanings and experiences of alcohol consumption and methanol poisoning is important for the implementation of possible technical tools, such as the POCT, and interventions to prevent and/or treat methanol poisoning.

1.2.3 Aspirations of point-of-care testing for methanol poisoning

Finally, this study will consider the potential for introducing POCTs for detecting methanol poisoning in Bangladeshi health facilities. The diagnosis of health conditions, diseases, and infections, a long-undervalued aspect of healthcare, is now widely recognised as being essential to tackling current global health challenges and as the 'weakest link' (World Health Organization, 2022) in health service delivery in LMICs (Moussy et al., 2018, Pai and Kohli, 2019, FIND, 2021). In recent years, an increased emphasis has been placed on the importance of access to diagnostics, reflected notably in the World Health Organization's (WHO) release of the WHO

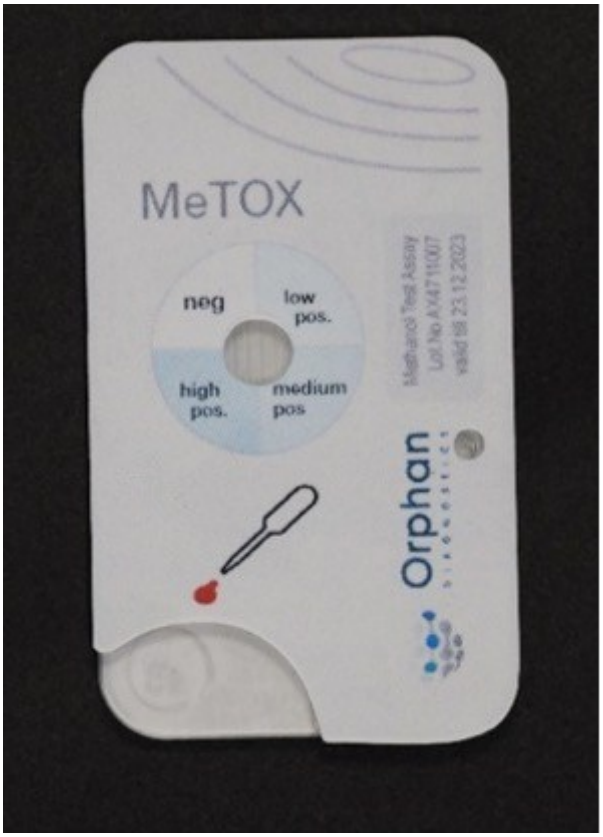
Model List of Essential Diagnostics List (EDL) in 2018 (World Health Organization, 2019, Pai et al., 2019) – a late-coming complement to the WHO Model List of Essential Medicines, first published in 1977 – and the publication of *The Lancet* Commission on Diagnostics in 2021 (Fleming et al., 2021).

POCTs, diagnostic tools that do not rely on modern laboratory equipment, are conducted at or near the site of the patient, and provide rapid turnover of results (Drain et al., 2014), feature centrally in this drive to improve diagnosis. These devices have risen to prominence over the past two decades and are perceived as particularly valuable in under-resourced settings because they are decoupled from dependence on modern laboratory equipment and highly skilled or extensively trained staff (Drain et al., 2014, Mitra and Sharma, 2021, Peeling and Mabey, 2010, Pai et al., 2012).

As methanol poisoning currently requires extensive laboratory testing and given its symptoms mirror those of other common health disorders, it is rarely tested for in LMICs. It is therefore only generally tested for when an outbreak of methanol poisoning is suspected. Moreover, treatment for methanol poisoning is most effective when initiated early, requiring early diagnosis (Hovda et al., 2017, McMartin et al., 2016). Therefore, by the time laboratory-based diagnosis is achieved, it is often too late, resulting in death or permanent brain or eye damage (Jones, 2021). Inscribed with potential to shortcut time to treatment initiation and guide health service provider decision-making, POCTs are promising devices for addressing methanol poisoning in under-resourced settings.

Colleagues of this larger NIHR RIGHT4 project have developed a POCT for rapidly diagnosis methanol poisoning (Hovda et al., 2021). This small device can detect formate in individuals using a single drop of blood. The test results are displayed in different ranges (semi-quantitative results): positive with high formate concentration, indicating that treatment should be initiated immediately, positive with a low- or medium concentration of formate, indicating that the patient should be closely monitored, and negative (see Figure 1).

Figure 1: Methanol poisoning test strip



In a laboratory setting, the test has demonstrated sensitivity of 95% and specificity of 100%. This test is designed to be used by doctors and nurses in health facilities but may also hold potential for decentralised use in community settings. These features indicate the values and expectations inscribed in the POCT device among its designers and the research team: e.g., simplicity, accuracy and rapidity. Yet, these values and expectations cannot be taken for granted, and will undergo negotiation, transformation, and contestation throughout its life cycle.

Critical social science studies have demonstrated that POCTs are inscribed with values that are under perpetual transformation throughout their lifecycles, from innovation, use and to disposal, and as they travel throughout different social spaces (Engel and Krumeich, 2020, Perkins et al., forthcoming, Street, 2023). This has implications for how such tests are incorporated into treatment pathways and surveillance systems. The larger NIHR RIGHT4 study will seek to trace these shifts and social dynamics as the POCT is introduced and tested. This research will be informed by the prior analysis of social and cultural meanings and experiences of alcohol consumption and methanol poisoning generated during this study. Through it, we will explore perceptions of, and expectations related to, the potential introduction of a POCT to accelerate diagnosis and initiation of treatment in individuals experiencing methanol poisoning in Bangladesh. We will explore aspirations and

potential value of the test among both health service providers and people in the community and their appetite for its implementation. This will both provide a starting point for understanding the value negotiation of the POCT, but also provide evidence which can be used to guide a socially informed approach to the introduction of the device and its implementation throughout the different phases of the study.

2 STUDY OBJECTIVES

2.1 MAIN OBJECTIVE

To illuminate the social and cultural meanings of alcohol production, distribution, and consumption in Bangladesh and perceptions and experiences of methanol poisoning within this context to inform public health policy and responses.

2.2 SPECIFIC OBJECTIVES

1. To explore the social and cultural meanings and valuations of alcohol production, distribution, and consumption in Bangladesh.

2. To explore experiences and perceptions of methanol poisoning, treatment, and care, including social, cultural context and the spatial and temporal dimensions of poisoning events.

3. To explore expectations, perceptions, and acceptability related to the potential introduction of a POCT for the early diagnosis of methanol poisoning to fast-track initiation of treatment.

4. To explore possibilities CEI in methanol poisoning research and intervention.

2.3 OUTCOMES

The findings from this study will result in several outcomes:

- Improved understanding of the social dimensions of alcohol production, distribution, and consumption in Bangladesh, a context in which alcohol consumption is highly restricted and generally considered deviant.

- Improved understanding of the social and cultural dimensions of methanol poisoning in Bangladesh.

- Improved understanding of people's experiences of formal and informal healthcare provision for poisoning episodes in Bangladesh.

- Knowledge about the acceptability and feasibility of introducing POCTs for rapidly identifying methanol poisoning in health facilities in Bangladesh.

2.4 SPECIFIC OUTPUTS

- Qualitative data to inform a pilot study to assess the acceptability of introducing a POCT for identifying methanol poisoning in patients in health care facilities.
- Academic articles published in social science journals that improve our understanding of the social and cultural dimensions of alcohol use and methanol poisoning in Bangladesh.
- Presentations at relevant national and international conferences, such as the Asia Pacific Association of Medical Toxicology (APAMT), Middle East and North Africa Toxicology Association (MENATOX) and the European Association of Social Anthropologists.

3 STUDY SETTING

The study will be conducted in the lower-middle income country of Bangladesh. Bangladesh gained independence from Pakistan in 1971 and experienced a tumultuous beginning to nationhood, riddled with natural and political turmoil (Van Schendel, 2020). It was famously referred to as a "basket case" by an advisor to Henry Kissinger during these early years, encapsulating the idea that despite extensive foreign investment in the country it was fated to dwindle amongst the poorest nations (Lewis, 2011). However, over the 1990s and 2000s, the country was extolled for its rapid improvements in many aspects of human development and making unexpected progress towards many of the Millennium Development Goals, notably its reduction of child and maternal mortality and school enrolment (Sen, 2013, Chowdhury et al., 2013, United Nations, 2015). International development has played an important role throughout this journey, and Bangladesh has been referred to as an "aid lab" (Hossain, 2017). Moreover, the country has a long history of not only being an importer of research and development, but also as an innovator through its "experimental exuberance" (Murphy, 2017) and exporter of research and development ideas (Hulme and Moore, 2006, Khandker et al., 2016). As such, the country provides a particularly fertile environment for this study and collaboration between international and national researchers.

This study will be multi-sited and launched from the recent methanol poisoning event in Kushtia district, located along the western border with India. Kushtia is home to a population of 1.7 million people, primarily residing in rural villages. Data for this study will be generated among community members in the Kushtia administrative centre and the *upazilas,* sub-districts, affected by the toxic alcohol event. Data will also be generated in the district hospital where several of the individuals sought health services in response to poisoning. This research will benefit from the team's experience and personal networks in the district: one of the researchers (JP) spent extensive time in the district carrying out ethnographic fieldwork there from 2019-2021. We will therefore be able build on pre-established relationships to carry out data generation in Kushtia.

Moving out from Kushtia district and following the recent poisoning event, data will be generated in Rajshahi district. Rajshahi district, bordering Kushtia district to the north, hosts a large medical college and was the referral hospital for patients suspected of experiencing methanol poisoning seeking treatment at Kushtia district hospital. In addition, alcohol-related harm in Rajshahi is relatively common, with 29 alcohol-related deaths reported in Rajshahi between 2019-21 (Uddin et al., 2022). The Toxicology Society of Bangladesh (TSB) team has been active in Rajshahi Medical College since 2015, and Rajshahi was among the medical colleges selected for the pilot cluster-randomized controlled trial for testing the feasibility of the POCT for diagnosing methanol poisoning in the larger study. We will build on these pre-established relationships in Rajshahi Medical College to generate this data. In addition, one of the poisoning victims identified in the newspaper reports of the toxic alcohol poisoning event in Kushtia was a politically active student at the prestigious Rajshahi University of Engineering and Technology (RUET). We will therefore carry out data generation among university students studying at RUET.

To allow for a more expansive perspective on alcohol and methanol poisoning in Bangladesh, we will generate data through news media outlets to capture representations of alcohol production, distribution, and consumption in Bangladesh and "toxic alcohol" events. In addition, we will generate data among representatives of formal alcohol producers. This data will likely be generated in Chuadanga District, Khulna division among alcohol producers affiliated with Carew & Co. in Damurhuda *upazila,* or in Dhaka among alcohol producers affiliated with Jamuna Distillery. Finally, we will also generate data in other (to be determined) settings where alcoholic beverages are consumed in Bangladesh.

4 RESEARCH TEAM

The team for this research project will include local and international researchers. This will facilitate the generation of complementary "insider" and "outsider" perspectives.

This study is nested within TSB's ongoing toxicology research work, based in Bangladesh. Since 2013, TSB has conducted research related to toxicology and pesticide poisoning and snake bites, in close collaboration with partners, including the Ministry of Health and Family Welfare (MOHFW). They are now expanding to examine other forms of poisoning in the country, including methanol poisoning.

The research team for this specific study is interdisciplinary with researchers proficient in anthropology, toxicology, participatory methods and community-based interventions from Bangladesh, the UK, and Denmark. It is led by two anthropologists (AS and JP). JP carried out long term ethnographic fieldwork as a doctoral researcher in Kushtia district from 2019-2021, and therefore has an extensive knowledge of the social context and longstanding relationships to further build on within this study. Data generation will be led by this anthropologist guiding a Research Associate with experience and training in qualitative methods and social science and a Research

Assistant. The work will also have a strong Community Engagement and Involvement (CEI) element, supported by two NIHR RIGHT4 co-investigators (SW, RM). They will support the researchers to integrate community views of the research itself into the research.

TSB has been working in Rajshahi District since 2015 and has a rich understanding of the local context and well-established relationships in the medical college. These team members will facilitate research in the district, while the core qualitative research team will carry out data generation. The entire team will be engaged in iterative processes of data analysis and interpretation.

5 STUDY DESIGN AND METHODS

5.1 STUDY DESIGN

This study will employ a rapid ethnographic design. Rapid ethnography is underpinned by the epistemological and theoretical commitments of traditional forms of ethnography. In making a case for a differentiation between ethnography and anthropology, Tim Ingold describes the aim of ethnography as "to render an account—in writing, film, or other graphic media—of life as it is actually lived and experienced by a people, somewhere, sometime. Good ethnography is sensitive, contextually nuanced, richly detailed, and above all faithful to what it depicts" (Ingold, 2017). Conventionally, ethnography is associated with a lone researcher carrying out long term fieldwork in a research setting. Rapid ethnographic research designs[3], in contrast, aim to maintain the epistemological and theoretically foundations of ethnography, while delivering results in a shorter amount of time (Vindrola-Padros, 2021).

However, rather than simply "quick and dirty" ethnography (Hughes et al., 1995), Pink and Morgan propose shorter-term ethnographic research as not a lesser form of ethnography, but as "using different methodological, practical and analytical entry points into the lives of others" vis-à-vis longer term ethnographic research (Pink and Morgan, 2013). They propose the following core qualities as defining short-term ethnographic research: 1) Intensity of the research encounter: short-term ethnography involves starting with clearly delineated questions and bypasses some of the more latent aspects of long-term ethnography, such as "hanging around". When possible, it builds on existing relationships, so the researchers can place themselves at the centre of the research immediately. In addition, short-term ethnographies are data intensive, i.e., they generate a large body of data and from multiple sources (Knoblauch, 2005); 2) A focus on detail: In short-term ethnography, paying close and detailed attention to everyday practices and encounters, and probing into the invisible and unsaid is

[3] We recognize here that multiple nomenclatures have been put forth the describe research designs which draw from ethnography, but veer from the long term, lone-researcher model. These include "short-term ethnography" (Pink and Morgan, 2013), "focused ethnography" (Knoblauch, 2005) , "quick ethnography" (Handwerker, 2001), "rapid, site-switching ethnography" (Armstrong and Lowndes, 2018). However, we are employing the term rapid ethnography given the recent and extensive work undertaken to consolidate these designs (Vindrola-Padros, 2021) and in an effort to contribute to furthering the field of research practice.

paramount; 3) The ethnographic-theoretical dialogue: short-term ethnography involves ongoing dialogue with theory, and data generation and analysis are more closely intertwined than is often the case in long-term ethnography. They also tend to be informed by anthropological and other social science theory (Vindrola-Padros, 2021). From a practical standpoint, short-term ethnography is more likely to be carried out by a team of researchers than long-term ethnography, and draws from a broader range of expertise (Vindrola-Padros, 2021).

This project is designed as a rapid ethnography and will therefore maintain the commitments of ethnographic research as a way of "being-in-the-world", in which the ethnographers seek to see and understand the world through the eyes of others (Vindrola-Padros, 2021, p. 5). It will be carried out through concentrated periods of fieldwork and maintain the qualities of intensity, attention to detail, and theoretical engagement. It will be carried out by a team and build on pre-established expertise of and relationships in the research settings (described in Section 4). It will be multi-sited (Marcus, 1995), generating data across space, and maintain a multi-scalar view, considering connections operating across space and time (Xiang, 2013).

This particular study will mark the first of several rapid ethnographies planned during the 5-year NIHR RIGHT4 project cycle. Thus, the umbrella study will be characterized by a long-term engagement of the research team with research participants and will be punctuated by several rapid ethnographic sub-studies throughout the project timeframe, supported by CEI.

5.2 RESEARCH METHODS

This study will be multi-sited and multi-method, engaging with different actors and media. The aim to generate a holistic understanding of the social and cultural valorisations and meaning of alcohol production, distribution and consumption and poisoning through "toxic alcohol" within this context. See Table 1 for a summary of data generation methods.

Table 1: Data generation grid

5.2.1 Ethnographic content analysis

News media plays an important role in communicating ideas and values and influences what people perceive as reality. Anthropologists engaging with news media approach this form of media not as a reflection of reality, but as reflecting, and re-shaping, social values and meanings (Bird, 2010, Silverstone, 2007, Costa et al., 2022). Jack Lule invites us to consider news as myth, not in the sense of a false or fictitious story, but as a societal story that "expresses prevailing ideals, ideologies, values, and beliefs" (Lule, 2005, p. 102). Within this study, we will carry out an ethnographic content analysis (Altheide and Schneider, 2012) of newspaper articles published in national print news media outlets to understand the ideals, ideologies, values and beliefs represented pertaining to alcohol in Bangladesh. It will also allow for situating the methanol poisoning event in Kushtia within a longer narrative across time and space in the country.

To do this, we will search selected national news media outlets, including Prothom Alo (Bangla/English), Kaler Kontho (Bangla), Jonokontho (Bangla), and Dhaka Tribune (English) and others, to identify published articles reporting on alcohol production, distribution, and consumption in Bangladesh and on events in which "toxic alcohol" and "alcohol poisoning" are involved. We will extract data from each of these articles and analyse the extracted data to understand how alcohol is framed in national news media and how identities of individuals involved in alcohol are constructed in these narratives. We will also analyse how methanol poisoning, or "toxic alcohol", is framed and the identities of these who are involved in and affected by related poisoning events. We will consider similarities across news media articles and how these constitute an overarching myth related to alcohol and methanol poisoning in Bangladesh, shifts in narratives over time, as well as variations. The reporting of the poisoning event in Kushtia will be placed within this narrative and consistencies and deviations from the narrative identified.

In addition, illuminating the "myth" of alcohol and methanol poisoning will allow for exploring points of consistency and disjunctures between this myth and people's articulations of uncontaminated and contaminated alcohol production, distribution and consumption in Bangladesh.

5.2.2 In-depth oral history interviews

In-depth oral history interviews will be carried out with 7-10 individuals from households in Kushtia who have experienced the poisoning of a family member as a result of "toxic alcohol" ingestion and 4-6 survivors of poisoning resulting from "toxic alcohol" poisoning in Kushtia, Rajshahi, or other areas. These interviews will address perceptions related to the sourcing and consumption of alcohol, spatial and temporal dimensions of methanol poisoning events, and experiences of healthcare and treatment. Interviews will follow a topic guide and take a chronological structure,

exploring the temporal unfolding of major life events, the sourcing and consumption of alcohol, specific poisoning events, and the place of those events within the participant's biography. Interviews will be carried out by a trained social science researchers and recorded where permission is given, and notes will be taken during and directly after the interview. These interviews will likely last between 1.5-2 hours if participants are willing to allow for an in-depth narrative recounting of the event. The interview may be conducted over two sessions if this is desired by the participant..

5.2.3 Semi-structured in-depth interviews

In-depth semi-structured interviews will be carried out with different groups of individuals to explore their thoughts, beliefs, experiences, and perceptions in relation to alcohol production, distribution, and consumption within their social settings, perceptions of "toxic alcohol", and experiences they have encountered involving "toxic alcohol", and medical treatment pathways for people experiencing poisoning due to "toxic alcohol". Specifically, they will explore where potential delays in treatment occur, i.e. in seeking care within a health facility, obtaining care within a health facility, or in the referral from one health facility to another. Finally, these interviews will also probe participants' opinions and expectations related to the potential introduction of a POCT for methanol poisoning diagnosis. Interviews will be carried out by a trained researchers and are expected to last approximately 1 hour. If consent is granted, semi-structured interviews will be recorded, and notes will be taken during and directly after the interview.

- *Health service managers and providers* (n=27)*:* We will carry out interviews with government health managers in Kushtia and Rajshahi districts, including medical college/district hospital managers and resident medical officers (n=4), district civil surgeons (n=2), medical doctors (n=8) and auxiliary health staff (n=8). In addition to government health staff, we will interview private health managers (n=5). These interviews will explore participants' perceptions of alcohol, poisoning through ingestion of "toxic alcohol" and experiences treating patients presenting with poisoning through "toxic alcohol" and other potential sources in the hospital. They will also explore participants' perceptions of the potential introduction of POCTs to rapidly diagnose methanol poisoning, how this diagnostic device could be integrated within the health system and anticipated challenges to its introduction.

- *Alcohol producers:* We will interview 3-4 representatives of domestic alcohol producers (i.e., Carew & Co. and/or Jamuna Distillery Limited). During these interviews we will explore experiences of alcohol production in Bangladesh, target markets, and boundary constitution of formal and informal alcohol production. We will also explore their perceptions of "toxic alcohol" poisoning and how this is articulated within the broader social context of alcohol production, distribution, and consumption.

- *Police officers:* We will interview 3-4 police officers in Kushtia. These interviews will explore the local legal context of alcohol production, distribution and use in Kushtia and the articulation of legal dimensions alongside social and religious dimensions. They will also consider "toxic alcohol" as situated within the socio-legal normative context, and the potential law enforcement implications of introducing a POCT for detecting methanol poisoning.

- *People who consume alcohol:* If identified, and if the safety and well-being of such participants can be ensured, we will interview participants who have consumed alcohol and are willing to discuss this. These interviews will explore their experiences with consuming alcohol, the social and religious dimensions of alcohol consumption, sourcing of alcohol, and perception of potential risks of encountering "toxic alcohol". Finally, we will explore the possibility of introducing a POCT for detecting methanol poisoning, desirability of introducing the device, and potential pitfalls from the perspective of those who have consumed alcohol.

5.2.4 Focus group discussions

Focus group discussions (FGDs) will be carried out to understand participants' perceptions of alcohol production, distribution, and consumption in Bangladesh, "toxic alcohol" poisoning as embedded within the wider social context of alcohol consumption and practices, and perceptions of the recent "toxic alcohol" poisoning events. The FGDs will focus on group norms and participants' beliefs, thoughts, experiences and perceptions, allowing for the generation of data that participants may be more likely to reveal in a social and interactive setting than in one-to-one interviews. The FGDs will also reveal the diversity of views in a particular sub-group and are useful for determining differences of opinion and normative positions (Hennink, Hutter and Bailey, 2020). Three FGDs will be conducted with local leaders in Kushtia: one will be carried out with local political leaders (e.g., the UNO, *upazila parishad* members), one with local religious leaders, representing Muslim, Hindu, and Christian communities, and one with a mix of local political, religious, business, NGO, and other leaders who did not participate in the other groups. Each FGD will be composed of 6-8 individuals.

In addition, four FDGs will be carried out with university students. Two of these will be carried out with students residing in Kushtia, while two will be carried out at the Rajshahi University of Engineering and Technology (RUET), where a student coming from Kushtia recently passed away as a result of consuming "toxic alcohol". FGDs will be composed of 6-8 individuals and will be segregated according to gender.

FGDs will last 1-1.5 hours and be co-facilitated by two members of the research team using a topic guide and audio recorded if permission is granted by all the participants.

5.2.5 Ethnographic observations

We will carry out ethnographic observations in Kushtia district hospital and in Rajshahi Medical College in the emergency departments in which patients suspects of poisoning are treated. These will be carried out over three weeks by trained anthropologists with experience conducting hospital ethnography. During these observations, researchers will pay attention to the infrastructural context, intra-hospital social relations, perceptions towards alcohol and "toxic alcohol" poisoning within the hospital setting and patient treatment pathways that influence the treatment of patients presenting with poisoning. They will engage in informal conversations among health staff, as well as patients and families. Researchers will take detailed fieldnotes of these observations and conversations.

In addition, we will engage in ethnographic observation of events in which alcohol is consumed in Bangladesh. These will be carried out by a foreign researcher who is not under the formal prohibition of consuming alcohol in the country. As these events are rare, they will be determined based on opportunities which arise in the location in which they occur.

6 STUDY POPULATION

6.1 NUMBER OF PARTICIPANTS

Research participants will include (see Table 2 for detailed list of participants):

- 10 family members of people affected by "toxic alcohol" consumption for oral history interview
- 4-6 survivors of poisoning from "toxic alcohol" for oral history interview
- 27 formal health service providers and managers for semi-structured interviews
- 3-4 police officers for semi-structured interviews
- 3-4 representatives of domestic alcohol producers for semi-structured interviews
- Up to 48 participants in FGDs (six FGDs will be held with 6-8 participants in each group).
- Possible interviews (number TBD) with individuals willing to discuss personal experiences with alcohol consumption.

Table 2: Research participant framework

1,2,3	Family members of individuals who have experienced "toxic alcohol" poisoning	Kushtia	7-10	1	7-10
1,2,3	Survivors of poisoning as a result of "toxic alcohol"	Kushtia/Rajshahi/TBD	4-6	1	4-6
Health service managers and providers					
1,2,3	Health managers (Hospital manager, RMO, civil surgeon)	Kushtia	3	1	3
1,2,3	Health managers (Hospital manager, RMO, civil surgeon)	Rajshahi	3	1	3
1,2,3	Doctors	Kushtia	4	1	4
1,2,3	Doctors	Rajshahi	4	1	4
1,2,3	Auxiliary health staff	Kushtia	4	1	4
1,2,3	Auxiliary health staff	Rajshahi	4	1	4
1,2,3	Private health service managers	Kushtia	5	1	5
Non-health service					
1,2,3	Police officers	Kushtia	3-4	1	3-4
1,2	Alcohol producers	TBD	3-4	1	3-4
1,2,3	People who consume alcohol	TBD	TBD		TBD
1,2,3	Local leaders (e.g., political, religious, business)	Kushtia	3	6-8	18-24
1,2,3	University students	Kushtia	2	6-8	12-16
1,2,3	University students	Rajshahi	2	6-8	12-16
1,2,3	National-level policymakers	Dhaka	2	6-8	12-16
1,2	N/A	N/A	N/A	N/A	N/A
1,2,3	District hospital	Kushtia	N/A	N/A	N/A
1,2,3	Medical college	Rajshahi	N/A	N/A	N/A
1,2	TBD	TBD	N/A	N/A	N/A

6.2 INCLUSION CRITERIA

Individuals over the age of 18 who are willing and able to provide informed consent will be asked to participate in the study.

Health care providers who have been in service for at least three years, and for at least one year in the study site, will be invited to participate in the study.

6.3 EXCLUSION CRITERIA

Individuals who are unwilling or unable to provide informed consent will not be included in the study.

Individuals under the age of 18 years will be excluded from the study.

6.4 JUSTIFICATION FOR INCLUSION OF VULNERABLE POPULATIONS

This study will include the following vulnerable populations:

- **Bereaved individuals:** This study will include family members of individuals who have been lost or experienced permanent impairment through poisoning due to ingesting "toxic alcohol". These individuals are likely to be grieving a loved one and may experience emotional discomfort when discussing distressing events. It is important to include these participants as their insights can contribute to helping others who may experience similar situations, or avoiding similar situations, in their communities and throughout Bangladesh and South Asia. Moreover, on an individual level, while interviews about sensitive topics can be upsetting, research has shown that they can be experienced as beneficial (Biddle et al., 2013, Sørensen et al., 2017). In addition, initial discussions with community members in Kushtia through a team member's personal relationships suggest that family members are open and interested in discussing the event. No individuals who are children or were children at the time of the poisoning event will be included in the study.
- **Individuals who have experienced poisoning resulting from consumption of "toxic alcohol":** If appropriate, we may approach survivors of methanol poisoning to invite them to participate in the study. These individuals may be vulnerable from having passed through this traumatic experience. They may also not wish to disclose their health conditions as having resulted from the consumption of "toxic alcohol". However, their experiences will be important to understand to the social and cultural context of methanol poisoning and how individuals experience this event. We will exercise extreme caution when approaching these individuals, and only do so if we can ensure that participation in the research will not compromise their social status or emotional wellbeing. However, as with other vulnerable groups, it may well be possible that participation could be beneficial for them, if carried out sensitively. No individuals with cognitive impairments will be included in the study.
- **Individuals who have previous experience, either personal or within their social group, of problems stemming from alcohol use:** This may include encounters with toxic alcohol, or other problems stemming from problem drinking behaviours, e.g., health related issues, violence. Including such individuals is necessary for understanding the social context of alcohol in Bangladesh. Again, while this may engender some emotional discomfort, it is likely that discussing these issues will be beneficial to participants (Biddle et al., 2013, Sørensen et al., 2017).

- **Muslim participants who engage in alcohol consumption:** During the course of the project, we may interview participants willing to discuss their engagement in (uncontaminated and contaminated) alcohol consumption practices or carry out ethnographic observations among such participants. These individuals are vulnerable due to the prohibitive social and legal nature of alcohol in Bangladesh. As mentioned in the introduction, Muslims without a license are legally prohibited from consuming alcohol; those that do can face a fine or imprisonment. However, engaging with these research participants will be important for understanding the social dimensions of alcohol and alcohol-related practices in Bangladesh. In carrying out such research, this project will join a host of social science researchers who study illicit consumption practices, usually in the form of illicit drugs (Bell and Salmon, 2011, Small et al., 2014, Bourgois, 1998), and scholars who have forged ethnographic research which include an exploration of alcohol consumption in similarly restrictive Muslim-majority country contexts (Schielke, 2015, Debrevec, 2012). We will exercise extreme caution when carrying out research activities among these participants. In the case of interviews, we will conduct these in a private and safe location, and only carrying out interviews if full confidentially can be ensured. In the case of ethnographic observations, no personal identifiable information of research participants will be collected or documented.

6.5 POTENTIAL RISKS AND RISK MITIGATION

The primary risk from the study is possible emotional distress participants may experience during interviews, particularly among vulnerable populations (see Section 6.4). During data generation, we will work to minimise distress experienced by participants. We will ensure an empathetic, non-judgemental and safe environment, e.g., by conducting interviews in a quiet space away from others in a location which is safe and convenient for both the participant and researcher. The research team will receive comprehensive training to ensure this. If participants display emotional discomfort, the researchers will pause the interview and allow the participant to decide if and when to resume the interview. If participants experience distress resulting from participation, we will provide them information on available mental health services and support. These include the public Rajshahi Medical College, and the following private medical colleges in Rajshahi: Barind Medical College, Shah Mokhdum Medical College, Islami Bank Medical College, Divisional Drug Addiction Treatment and Rehabilitation Centre. In Kushtia, we will refer research participants to Ad-din Foundation Hospital for mental health services. If necessary, we will assist research participants to access necessary mental health resources through the health system.

A remote risk of the study could be potential legal troubles for participants admitting to engaging in unlicensed alcohol production or consumption. However, this would only occur if confidentiality and anonymity is not maintained. While confidentiality

and anonymity will be carefully maintained for all participants, it will be particularly strict for participants disclosing information related to personal engagement in alcohol production or consumption. These participants will be referred to by a numerical code in research data, and all personal identifiers will be stored separately from research data. In ethnographic observation settings involving alcohol, only general characteristic of participants will be noted.

Finally, we will collect verbal rather than written consent from participants representing vulnerable populations as the sensitivity of the topic is likely to mean that signing written informed consent forms could cause distress and discomfort to these participants. We will still provide these participants with a participant information sheet (PIS) and allow them sufficient time (at least 24 hours) to decide whether they would like to participate.

7 PARTICIPANT SELECTION AND ENROLMENT

7.1 IDENTIFYING PARTICIPANTS

This rapid ethnography will build on prior relationships established in the research sites to identify research participants, both in Kushtia and in Rajshahi. The research team will approach relevant health authorities before proceeding with the study. They will obtain formal administrative approval from the Directorate General of Health Services (DGHS) under the Ministry of Health and Family Welfare (MOHFW) to carry out the study in Kushtia and Rajshahi districts. In these districts, researchers will meet with the district health authorities and hospital authorities to explain the purpose of the study and how it will be beneficial for the local population. In Rajshahi, these benefits will be direct, as the POCT will be tested in the district medical college and therefore people will benefit directly from the availability of the POCT, and benefit more fully if the trial is adapted to the local social context. In Kushtia, the POCT cannot be tested in the district hospital as the required infrastructure is not in place. However, assuming the POCT trial is successful and can be expanded, the POCT will be fast-tracked to the district. The district may also benefit from longer term engagement of the project through CEI to address methanol poisoning. The researchers will also explain what taking part in the study will involve for health staff and individuals in the local area, as well as the potential risks. These meetings will be carried out in the spirit of CEI and will provide a platform for health managers to express their concerns and interests and have these included in the study processes. It will also serve to establish channels for regular feedback regarding the study and emerging findings.

After gaining approval from district level officials, eligible individuals will be identified and approached by a member of the research team who will invite them to participate in the study face-to-face. Potential participants will be provided a PIS (see appendix) at this time. No other invitation materials will be used.

7.2 CONSENTING PARTICIPANTS

Participants will be included in the study only if they provide informed consent. Taking consent from participants will be formally delegated by the PI and documented using a Delegation Log.

A detailed informed consent procedure will be conducted in person at the time of recruitment at a convenient location for the participants:

- We will provide each participant with an information sheet and an accompanying consent form and give the participant time to read it and ask any further questions. If they are illiterate, a member of the research team will read through the information sheet verbally. The information sheet will explain: (i) The project objectives and information about funders and collaborating institutions; (ii) What is involved in participating (iii) that participation is voluntary, they may decline to participate, refuse to answer any question, and can decline from the study at any time; (iv) How personal data will be used, stored and shared over the lifetime of the project and the actions we will take to maintain confidentiality; (v) Any risks and benefits associated with participation in the study.
- Participants will be invited to participate and read the information sheet at least one day (>24 hours) before the interview or FGD is scheduled. This will allow them time to reflect on their potential participation.
- An accompanying informed consent form will ask participants (with the exception of family members of those who have experienced poisoning as a result of toxic alcohol, methanol poisoning survivors, and those discussing their own alcohol consumption) to confirm they have been informed of each of the above points and that they agree to participate in the study at the time of data generation and provide their signature in written form.
- For research participants who are family members of those who have experienced poisoning resulting from the consumption of toxic alcohol, methanol poisoning survivors, and those discussing their own alcohol consumption, the researchers will ask participants to provide verbal informed consent, rather than written. We will obtain verbal informed consent as the research addresses issues that are both sensitive and may be illegal, for example alcohol consumption. Participants are likely to be uncomfortable signing documents that they feel may be incriminating. For these participants, researchers will use an informed consent checklist to ask participants to provide verbal consent for each of the points covered.
- All research team members involved in taking consent will be trained in good practice for this purpose.
- Researchers will maintain electronic documentation of verbal consent provided by participants in their records.
- Participants will be given a copy of the consent form to keep for their records.

7.2.1 Withdrawal of Study Participants

Participants are free to withdraw from the study at any point or a participant can be withdrawn by the research team, for example if it appears that a participant do not want to be involved, though they do not express this verbally. If withdrawal occurs, the primary reason for withdrawal will be documented in the participant's case report form if possible. The participant will have the option of withdrawal from all aspects of the study at any point while data generation is still ongoing and before data analysis has started. If they withdraw from the project the data collected from them to date will be included in the analysis.

8 COMMUNITY ENGAGEMENT AND INVOLVEMENT

CEI in this project will be prioritised throughout the research to ensure that research participants have a voice in the design, delivery and dissemination of the research and that the research is attuned to local needs and interests. We will focus on CEI as strategies that support active partnerships with community stakeholders enabling them to shape and influence the research and/ or dissemination of findings. CEI will be a means through which we keep a pulse on the community's acceptance of the research and the ways in which the research is being carried out. While CEI is always important, its importance is magnified in the context of this study as alcohol consumption in Bangladesh is a highly sensitive topic, and methanol poisoning is exclusively associated with alcohol consumption.

CEI on this project will be initiated through meetings with local health officials to understand their concerns and interests and incorporate these into the study design. Minutes will be kept for the meetings and stored in an accessible format. Thereafter, we will hold quarterly reflection meetings with local health officials throughout data collection and analysis to share preliminary findings and gather their insights, which can be integrated into further data generation and analysis on an ongoing basis.

CEI will be prioritised throughout data generation blocks, and research participants will be asked to describe what they would like to know regarding the research topic and knowledge that would be beneficial for them, their families, and communities. The rapid ethnographic design of this project will facilitate incorporating these concerns into data generation. These concerns and recommendations raised by participants will be considered and integrated into data generation tools between each block of intensive data generation.

We will work to ensure that not only are more powerful research participants' voices integrated into the research, but also those whose voices are more likely to be marginalised. We will do this by including that a demographic cross-section of individuals in the study representing different genders (women, men and hijra, if relevant), age categories (18+), socio-economic strata, and geographic residency (rural and peri-urban) and ensuring that these different groups' opinions are given weight in guiding the direction of the study.

Finally, we will prioritise research dissemination within different communities whom we have engaged. After data has been analysed, we will hold four dissemination

events with different groups of research participants to share the results. We will do this by organising courtyard meetings with the community leaders and members who participated in the research and inviting others representing a socio-demographic sub-section of the community. Dissemination events will provide a platform for different actors to comment on the interpretation of findings, which can then be incorporated into research outputs, and communicated to policymakers and practitioners at district and national levels.

9 DATA GENERATION

9.1 DATA GENERATION PROCESSES

Intensive data generation will be carried out in three phases of short-term ethnographic data generation rounds of approximately 3-4 weeks, with intervals for stepping back and analysing data in between them. These phases of generation will be planned so that each phase includes data generation across methods and sites. This will allow for iteration in the study design and analysis and facilitate reflections from different participants and from different sites to be incorporated and reflected on by other participants in different sites.

A full description of the methods can be found in Section 4 above. The **processes** of data generation are as follows:

Ethnographic content analysis: A researcher will carry out an exhaustive search of four national facing electronic newspapers Prothom Alo, Kaler Kontho, Jonokontho, and Dhaka Tribune since 2010 (or from the date of establishment of the news outlet) to identify all publications regarding the production, distribution, and consumption of alcohol in Bangladesh and those reporting on incidents of "toxic alcohol" or poisoning resulting from alcohol consumption. For newspapers with English versions in addition to Bangla (i.e., Prothome Alo and Dhaka Tribune), the search will identify articles published in both languages. After identifying the articles, we will use an electronic software, either NVivo or Excel, to extract data related to the representation of alcohol and poisoning as a result of alcohol.

For articles reporting on alcohol in general we will extract the following information: date of event and date reported; location of event reported; aspect of alcohol reported (i.e., production, distribution, consumption, regulation); representations of involved individuals; social, cultural, economic, and legal dimensions reported.

For articles reporting on a "toxic alcohol" event, we will extract the following information: date of event and date reported; location of event reported; aspect of alcohol reported (i.e., production, distribution, consumption, regulation); representations of involved individuals; social, economic, and legal dimensions reported; health systems aspects reported; patient health pathways reported.

The data will then be analysed to identify points of consistencies and inconsistencies, the unfolding of the reporting of events across time and space, and an overall "myth" created through these representations.

Oral history and semi-structured interviews: Interviews will be conducted by two researchers with training in qualitative interview methods. Interviews will follow a topic guide (see Appendices). All interviews will be carried out in Bangla. Interviews will be carried out in private spaces in the community, whether outside or in people's homes or, in the case of the hospital, in a private room/office. The interviewer will document the participant number, date, time, location of the interview, interviewer name and basic demographic information of the interviewee (age, gender, occupation) on a hard-copy interview data form. Interviews will be audio-recorded using a pin-protected audio voice recorder.

An ethnographic observation form will be completed for each interview. This will be used to record notes and details around the context and setting of the interview, informal social interactions occurring around the interview, immediate impressions throughout the interview, and researchers' immediate reflections following the interview.

In addition, researchers will complete a brief data generation summary form after each interview to facilitate data analysis (see Section 12).

FGDs: FGDs with local leaders and students will take place in a public place in the community, for example in the courtyard of the local health complex, or a common area of the university. FGDs with policymakers will be conducted in an appropriate venue in Dhaka. They will be carried out by two researchers with training in FGDs and qualitative methods. The researchers will document the participant numbers, date, time, location of the FGD, and basic demographic information of the participants (age, gender, occupation) on a hard-copy FGD data form. If participants consent, FGDs will be audio-recorded using a digital voice recorder device.

As with the interviews, an ethnographic observation form will be completed for each FGD. This will be used to record notes and details around the context and setting of the FGD, informal social interactions occurring around the FGD, social dynamics during the FGD, immediate impressions throughout the FGD, and researchers' immediate reflections following the FGD.

In addition, researchers will complete a brief data generation summary form after each FGD to facilitate data analysis (see Section 12).

Ethnographic observations: In Kushtia district hospital and Rajshahi Medical College, ethnographic observation will be conducted by spending time with those involved in public hospitals in emergency wards where patients presenting with

poisoning are treated. The researchers will observe the socio-spatial organization of the hospital, how poisoning in general and methanol poisoning specifically is given meaning and addressed in this context, and how alcohol consumption is discussed informally. They will stay attuned to social interactions and conversations about poisoning, methanol poisoning, and alcohol production, distribution and use and engage people in informal discussions on these topics. Through these observations and informal discussions, the researchers will seek to make sense of how alcohol is discussed as a social, cultural, religious, and health issue and methanol poisoning is articulated within these discussions.

Ethnographic observations may also be carried out in spaces in which alcohol is consumed in Bangladesh. During these observations, a researcher will carry out ethnographic observations of drinking practices and engage people in conversation related to drinking practices. If appropriate, researchers will jot written fieldnotes throughout the experience. If this appears to make participants uncomfortable, fieldnotes will be written immediately after the event.

The researchers will keep detailed written field notes throughout observation activities of observations, interactions and conversations. They will transform written fieldnotes into electronic field notes at the end of each day of ethnographic observation. Brief data generation summary forms will also be completed at the end of each observation (see Section 12).

9.2 SOURCE DATA DOCUMENTATION

Source documents will include:

- NVivo or excel files with data extracted from newspapers articles
- Hand-written and electronic field notes
- Transcripts of semi-structured interviews and oral history interviews
- English translated version of the semi-structured interviews and oral history interviews
- Transcripts of FGDs
- English translated version of the FGDs
- Hard-copy data forms for interviews and FGDs
- Data generation summary forms

10 DATA ANALYSIS

Following a rapid ethnographic approach, data analysis will be carried out simultaneously with data generation, will engage in ethnographic-theory dialogue, and will engage the range of expertise among the broader team, and pay attention to reflexivity by considering how the researchers and their positionality shape the research throughout all phases.

Processes of data analysis will be conducted throughout the different phases of the study as follows:

During intensive data generation blocks: the core team of researchers generating data in the field will hold daily team meetings to briefly discuss preliminary findings, raise theoretical and practical issues, and potential areas for further enquiry. These observations and preliminary findings will be recorded in data generation summary forms (see appendix) including categories of reflection for each of the study objectives, theoretical considerations, areas of interest raised by research participants for CEI, and new potential threads of enquiry that emerged. Separate forms will be completed in an Excel spreadsheet for each data generation method and group of participants. These forms will allow for simultaneous data generation and analysis and will facilitate overall rapidity in data analysis.

At the end of each week, a brief summary report of preliminary findings and theoretical reflections will be prepared and shared with the lead anthropologist (AS) on the project for feedback. A monthly summary report of emerging finding will they

be prepared and shared with the interdisciplinary NIHR RIGHT4 project team for observations and insights so that the analysis can benefit from the expertise of the entire team. This will also facilitate the use of preliminary findings across other arms of the umbrella study.

Interim period between data generation blocks: Preliminary data from the data generation summary forms will be analysed in depth. Selective transcription and translation of qualitative data (from interviews, focus group discussions, and ethnographic field notes) will be carried at and this data subjected to more detailed analysis. Research themes will begin emerging through this process. These themes will be fed back into the data generation tools to allow for emerging findings to be probed and new areas of enquiry integrated during subsequent intensive data generation blocks. In addition, areas of interest and suggestions raised by research participants will be considered and integrated into data generation tools for subsequent data generation.

Following data generation: At the completion of the three data generation blocks, transcription and translation of interviews and FGDs data will be analysed in more depth. From this analysis, meta-level themes (implicit topics that organise groups of repeating ideas) will begin to emerge. These meta-themes will be refined during a workshop conducted in Bangladesh with the entire research team. Based on outcomes of this workshop, we will put the refined themes into dialogue with the existing literature and social science theory, leading to the development of new understandings and concepts related to alcohol production, distribution, and consumption, methanol poisoning, and aspirations around diagnostics.

11 REFLEXIVITY

Reflexivity is foundational to any qualitative research and involves taking into account the researchers' positionality in shaping the research. Pillow describes reflexivity as the researchers' commitment to being "critically conscious through personal accounting of how the researcher's self-location (across for example, gender, race, class, sexuality, ethnicity, nationality), position, and interests influence all stages of the research process" (Pillow, 2003).

In team-based research, reflexivity involves a critical reflection of the multiple positionalities of research which influence each phase of the research process. Throughout the project, we will engage in team-based critical self-reflection using a process inspired by Braedly (2018) and Rankle (2021). A first stage of team-based reflexivity will be integrated into regular meetings for researchers to discuss themselves within the research, challenges encountered by researchers or within the team, limitations within the study and possible course corrections. In a second phase, more in-depth team reflexivity meeting will be held at regular intervals. These will be guided by a discussion guide covering different aspects of the researchers and team position within the research, assumptions and interests, and how these influence the

research processes and findings. These aspects of reflexivity will be documented and taken into account in research outputs.

12 TRANSCRIPTION AND TRANSLATION

12.1 TRANSCRIPTION SERVICES

Interviews and FGDs will be verbatim transcribed in Bangla and subsequently translated into English by a research assistant fluent in both Bangla and English.

12.2 TRANSLATION SERVICES

See section 10.1. After interviews and FGDs have been verbatim transcribed, they will be translated into English by a research assistant fluent in both Bangla and English.

13 DATA MANAGEMENT

13.1 BACKUP AND SECURITY OF DATA

If participants provide consent, interviews and FGDs will be recorded using a pin-protected digital audio recorder device. At the end of each day of data collection, audio files, field notes, and any other generated data will be transferred to encrypted, password-protected computers at TSB in Bangladesh. The audio files will then be backed up in a private, password-protected drive on the University of Edinburgh Research DataStore. This is high-quality, enterprise-standard storage with daily automatic backup.

13.2 DATA QUALITY

- **Standardisation of data capture:** While data capture will not be fully standardised given the type of data, semi-structured interview questionnaires will be designed for different categories of respondents to contribute to consistency between the interview topics covered.
- **Digitisation and data entry:** All fieldnotes and interview files will be prepared by the social science investigators.
- **Data checking:** Data files will be subject to checks for errors by software.
- **Data authenticity:** The responsibility for all data files lies with the Principal Investigator.
- **Transcription:** Interviews and FDGs may be transcribed by a member of the research team. A randomly-selected sample of transcribed files will be verified by a second member of the research team. If a significant number of errors/inconsistencies are revealed, this will be addressed with the transcriber.

13.3 PERSONAL DATA

The following personal data for each participant will be collected as part of the research:

- Village name
- Name
- Contact details (phone number)
- Marital status
- Employment
- Gender
- Age
- Date of interview/FGD

Personal participant data will be stored separately from research data. Hard copies of participant enrolment sheets will be stored by the research team at the TSB. Personal data access will only be available to the data manager. Participant personal data will be transferred to a digital logbook that will be stored on encrypted, password-protected computers in Bangladesh.

The following participant information will be recorded on interview/FGD transcripts (marital status, employment, gender, age) since it is necessary for data analysis. It is possible that some qualitative research data (audio recordings, transcripts and ethnographic fieldnotes) may contain identifying information such as names, specific employment details, place of residence. This data will be stored on DataShare and will be both encrypted and password protected. As far as possible, members of the research team in Bangladesh and Edinburgh will undertake de-identification of the research data while retaining the usefulness of the data for analysis. The folder of interview transcripts in DataShare will only be accessible to the members of the team who will be using the data.

Personal data collected on paper will be scanned, following which paper copies will be shredded and disposed of in secure bins. Electronic copies will be stored for up to 3 years after the study has ended. After this time, all personal data will be deleted. Audio recordings of the interviews will also be stored for 3 years after the project has ended, and then deleted after this time.

13.4 DE-IDENTIFICATION OF DATA

The electronic data collected for the study will be de-identified by a study ID. The following steps will be followed during the de-identification process:
(a) conduct a thorough review of the data to ensure any personally identifiable information such as names, addresses, or social security numbers are removed;

(b) develop a plan for de-identifying the data, which may involve the removal of personally identifiable information or substitution with unique identifiers;
(c) test the de-identification process to ensure accuracy and consistency;
(d) document the de-identification process and incorporate it into the data handling plan.

It is possible that some qualitative research data (audio recordings, transcripts and ethnographic fieldnotes) may contain identifying information such as names, specific employment details, place of residence. These data will be stored on DataStore and will be both encrypted and password protected. As far as possible, members of the research team in Bangladesh and Edinburgh will undertake de-identification of the research data while retaining the usefulness of the data for analysis. The folder of interview transcripts in DataStore will only be accessible to team members using the data.

Data will be stored in DataStore. Researchers analysing the data will be based in Universities of Edinburgh and TSB using password-protected, encrypted computers.

13.5 MANAGEMENT AND CURATION OF DATA

We will maintain meta-level data, relevant to the scale and type of the project, including:

- Research design and context of data collection: project history, aims, objectives, investigators, and funders.
- Data collection methods.
- Structure and number of data files containing raw data.
- Publications, presentations, and other research outputs that draw on the data.

For interviews, we will develop a data list detailing:

- Interview ID
- Age
- Gender
- Location
- Marital status
- Occupation
- Category
- Place of interview
- Date of interview

For FGDs, we will develop a data list detailing:

- FGD ID
- Date
- Location
- Category of participants

- Participant characteristics

For fieldnotes, we will maintain a data list detailing:

- Fieldnote ID
- Date
- Location

We will document any deviations from the stated methods for data collection.

We will draft a brief README.txt file that describes the research data files: file names; what they contain; how they are related; how they were created (e.g. data collection, analysis software, file format); how they should be used which will accompany any shared data or will orient us when using the data in the future.

13.5.1 Transfer of Data

Participant personal data will be retained in Bangladesh.

Qualitative research data (audio files, transcripts, translations,ethnographic field notes) will be shared between Bangladesh and Edinburgh research team members using DataShare. This data will be de-identified and not include participants' names, contact details, or village. The shared data will retain social and demographic information collected from participants.

13.5.2 Data Controller

The Data Controller for this study is TSB in Bangladesh.

13.5.3 Data Breaches

Any data breaches will be reported to the ethics committees in Bangladesh and Edinburgh. There are no regulatory requirements in Bangladesh for reporting of data breaches.

13.6 END OF PROJECT DATA MANAGEMENT

At the end of the project, the de-identified data will be transferred outside of Bangladesh to the University of Edinburgh's DataVault, a long-term data storage solution located in the United Kingdom, for 10 years. The de-identified data may be used for this or other ethically-approved research projects by the research team. Other researchers who wish to use the data can contact the PI for permission and will be required to keep the data confidential.

14 AUTHORSHIP POLICY

Ownership of the data arising from this study resides with the study team. Authorship will be in line with the Vancouver guidelines and following the four criteria defined by the International Committee of Medical Journal Editors (ICMJE). This includes that in order to become an author on a manuscript and individual must have made: (i)

substantial contributions to conception or design of the work, analysis, or interpretation of data; and (ii) drafting of the work or revising it critically for important intellectual content; and (iii) provided final approval of the version to be published and (iv) is in agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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