

De stront van Oudewater Den Haag speedhoofdstad
Noodklok om gebruik van drugs in Oudewater Speedgebruik

**What's the scoop? A sociological and concurrent triangulation approach
towards the news media on and wastewater-based epidemiology for drug use
in Dutch municipalities**

drugs Nieuwegein 'top-drugsstad' Drugs blijft een probleem
Onderwereld Op zoek naar 'snuvers' op Goeree Miami Vice

E. Melissa Boekholt (5893690)

Sociology, Utrecht University

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Supervisor: dr. Matthias Kern MSc

Second reader: dr. Rense Corten

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Abstract

Objectives: Wastewater-based epidemiology (WBE) is a new method for the detection and monitoring of population drug use that gains popularity in science and media. Although several Dutch municipalities already performed a WBE the phenomenon had not yet been studied within a sociological framework. Through a concurrent triangulation approach (i.e., literature study; critical discourse analysis (CDA); expert panel) this study aims to (i) investigate the extent to which WBE accurately detects and monitors population drug use in Dutch municipalities; (ii) critically analyse the news media's reporting on WBE in Dutch municipalities; and (iii) provide recommendations for future policy and research. **Methods:** First, an overview of the technical aspects of WBE for smaller populations was provided. Second, 135 on- and offline news articles were identified through LexisNexis and analysed in accordance with Fairclough's model of CDA. Third, 7 experts were recruited via maximum variation purposive sampling and have provided policy recommendations based upon the Delphi method. All qualitative data used in this study was analysed with NVivo 12. **Results:** Although WBE accurately detects drugs in the wastewater the extent to which reliable estimations of municipal drug consumption are constructed is questionable. Dissemination of the research outcomes requires nuance, yet this vanishes in the news media's drug discourse. The news media thereby adopt a narrative in which WBE is privileged over traditional drug monitoring tools. Several recommendations for policy, research, and dissemination are made. **Conclusions:** The method is a political tool for moral entrepreneurs that endorse the prohibitionist drug discourse and continuously stigmatize drug users. From a public health perspective, WBE alone is not a suitable starting point for policy and a collaborative approach between different monitoring tools is a must.

Keywords: concurrent triangulation; literature study; critical discourse analysis; expert panel; wastewater-based epidemiology; municipality; drug use; news media.

What's the scoop? A sociological and concurrent triangulation approach towards the news media on and wastewater-based epidemiology for drug use in Dutch municipalities

Iatrogenic risk produces moral panic. Ignorant citizens are ill equipped to understand what is happening around them. The void is filled by religiosity and other forms of superstition and ahistorical politics... it starts with young people, fetishized as unreliable custodians of a future that may not arrive, due to their amorality. Risk society and moral panic are crucial tools if we are to comprehend, and mend, this juggernaut of a nation. (Miller, 2006, p. 312)

1. Introduction

Wastewater-based epidemiology (WBE) as a method for the detection and monitoring of drug use is a new and growing field that gains popularity both in scientific literature and in the news media. Drugs and their corresponding metabolites (i.e., immediate by-products of the bodily metabolic process) are excreted in urine, sampled out of influent wastewater, measured, and back-calculated into user quantities (European Monitoring Centre for Drugs and Drug Addiction, 2020). Over time, WBE gives insight into geographical and temporal trends of local drug use (ibid.). The Dutch KWR Research Water Institute (KWR) started WBE in the major cities Amsterdam, Utrecht, and Eindhoven since its first participation in the European-wide investigation in 2011, coordinated by the Sewage Analysis CORE group Europe (SCORE). As stated on their website, the KWR "...has the ambition to make an inventory of drug use not only in the three major cities for which the EMCDDA report provides figures, but also in smaller municipalities in the Netherlands, and ultimately even throughout the Netherlands" [translated] (KWR Research Water Institute, 2016a).

Although the method is rapidly evolving and becoming more reliable over time there are some technical difficulties. For example, there are several uncertainties involved with every step in the approach to analysis (Castiglioni et al., 2013), the extent to which accurate estimations of population drug use can be constructed varies per drug type (Ort et al., 2018), and the analysis of small populations leads to troubling high variability rates (Ort et al., 2014). Moreover, the method does not provide information on who the drug users and what their drug use patterns are— epidemiologists therefore stress how the method cannot be utilized as a sole guide in befitting drug policy (Been et al., 2016). At time of writing this study, around thirty Dutch municipalities have commissioned the KWR to conduct a WBE locally (T. ter Laak, personal

communication, February 16, 2021), and several municipalities have adjusted their drug policy solely based upon the WBE study outcomes (Greven, 2016).

In addition, at time of writing this study a best practice for the dissemination of WBE outcomes to and by the media is yet to be established (EMCDDA, n.d.). Prichard et al. (2014) were one of the first to express the need for raised awareness about the ways in which the media interpret and report on WBE. Their concerns are not unfounded given the fact that the news media's reporting on drug use is often characterized by sensationalized, biased, and narrow statements (Ayres & Jewkes, 2012; Hughes et al., 2011; Rawstorne et al., 2020; Coomber et al., 2000; Hendriks Vettehen et al., 2005; Taylor, 2008). The news media thereby has the power to shape public discourse by the framings they choose (Entman, 1993). These often result into a zero-tolerance and prohibitionist drug discourse (Boydston et al., 2013; Watts, 2003; Goode & Ben-Yehuda, 1994), as well as the occurrence of 'drug scares' and 'moral panics' in media and postmodern society (Fredrickson et al., 2019; Atkinson & Sumnall, 2020; Reinerman & Levine, 1989; Forsyth, 2012; Boyd & Carter, 2010). Based on that, we might expect the same for the news media's reporting on municipal WBE studies. This is potentially troubling because of the media's key role in shaping drug discourse and policy (Belackova et al., 2011; Watts, 2003; Lancaster et al., 2011), however there is no research yet to verify this.

Despite these good reasons to investigate this issue only a few studies have touched upon the topic. Lancaster et al. (2019a; 2019b) are—to my knowledge—the sole ones who have analysed WBE from a critical social-science perspective. They argue that the method endorses the privileging of scientific data in drug policy, moves the focus away from harm reduction in the drug policy debate, and endorses the stigmatization of drug users (*ibid.*). Recently, the KWR has also become aware of the latter as one of their studies led to stigmatization of the municipality of Volendam. They themselves state the following (KWR, 2020a): "Precisely because drug use is a precarious subject for individuals and communities, this remains a dilemma for the wastewater-based epidemiologist." Clearly, more research is needed to address this. Taken together with the Dutch' pioneering position in harm-reduction policy (de Gee & van der Gouwe, 2020), as well as the KWR's goal to detect and monitor drug use in smaller municipalities throughout The Netherlands makes this the Dutch context a particularly good setting to study the issue through a sociological lens.

This study has three aims: (i) to investigate the extent to which WBE accurately detects and monitors population drug use in Dutch municipalities; (ii) to critically analyse the news media's reporting on WBE in Dutch municipalities; and (iii) to provide recommendations for future policy and research. A sociological and mixed method approach i.e., concurrent

triangulation design is needed to attain these objectives, resulting into the following research questions: (i) how accurately can WBE detect and monitor population drug use in Dutch municipalities; (ii) how does the news media report on WBE studies conducted at Dutch municipalities and how can these be depicted within the dominant drug discourse; and (iii) under which conditions can WBE for Dutch municipalities be implemented in the most optimal way? By doing so this study fills a major gap in literature and offers tools for future policy. More importantly, it builds the needed bridge between wastewater-based and drug epidemiologists who have been working at cross purpose within their collective field of drug monitoring.

This study is organized as follows. Chapter 2 provides an answer to the first research question by means of an analytical literature study on WBE for Dutch municipalities. Chapter 3 sketches the discourse through a sociological-theoretical framework in which the current drug policy climate and the role of the media are discussed. Chapter 4 outlines the methodological approaches to inquiry i.e., critical discourse analysis and expert panel. Chapter 5 provides an answer to the second and third research question: first, the most important findings from the critical discourse analysis are discussed; and second, policy recommendations as distilled from the expert panel are presented in a factsheet. A general discussion and conclusion of the findings is provided in Chapter 6 and 7.

2. Wastewater-based epidemiology

2.1. A step-by-step approach

Terminology

Mass load or drug residue is what remains in wastewater after bodily excretion and is used to quantify population drug consumption (EMCDDA, 2020).

Urinary biomarker is the measurable characteristic that is used to estimate population drug use. This is either the parent compound or the metabolite (ibid.).

Metabolite is the immediate by-product of the metabolic process when the body is breaking down the drug consumed (ibid.).

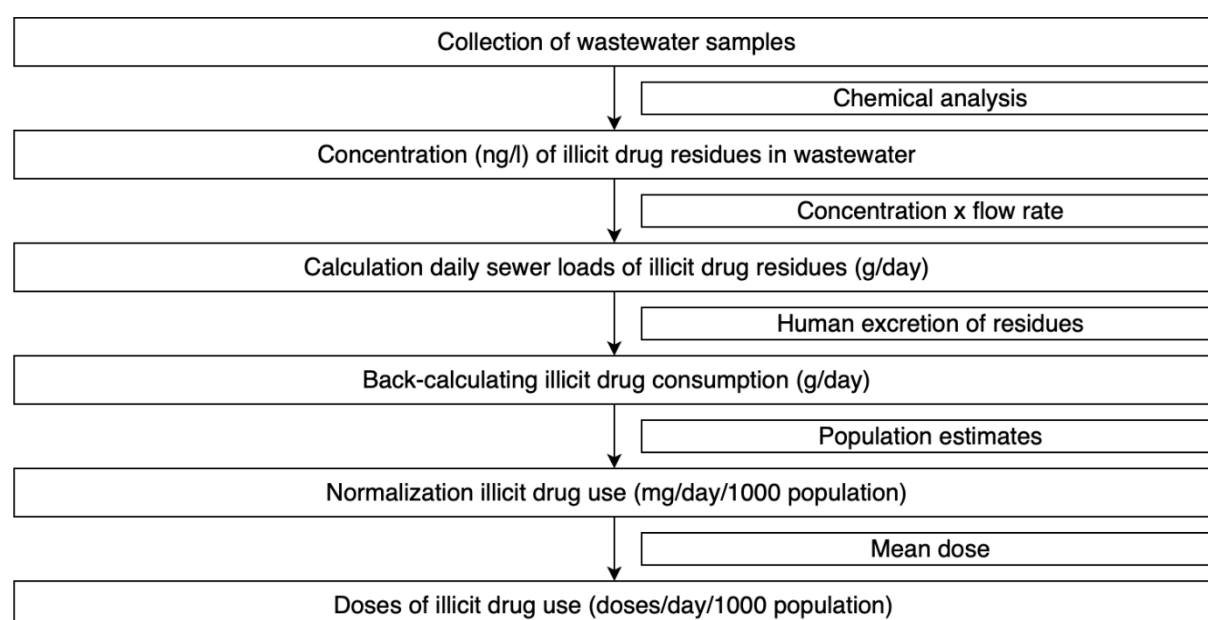
Back-calculation is the estimation process of population drug use based on the detected mass loads in influent wastewater samples (ibid.).

The approach taken within the field of WBE relies on the principle that drugs are consumed, excreted, and eventually end up in the sewage system (EMCDDA, 2016). WBE is used to estimate quantities of population drug consumption by measuring drug residues or ‘mass loads’ in influent wastewater samples taken from the target population’s wastewater-treatment plant (WWTP; Zarei et al., 2020; EMCDDA, 2020; Goulding et al., 2020; González-Mariño et al., 2020). In The Netherlands, the KWR constructs estimated quantities of the following drug types

via their corresponding urinary biomarkers: cocaine (i.e., the metabolite benzoylecgonine), amphetamine, methamphetamine, ecstasy (i.e., the active substance 3,4-methylenedioxymethamphetamine or abbreviated; MDMA), and cannabis or THC (i.e., the urinary metabolite THC-COOH; KWR, 2016b). The mass loads detected in analysis are normalized so that comparisons can be made with other WBE data i.e., other areas and different population sizes (EMCDDA, n.d.). The WBE results are thus back-calculated and presented in daily amounts or daily doses per thousand population (mg/day/1000 population; *ibid.*). A schematic overview of the stepwise approach taken in WBE to construct these normalized estimations, as well as the data required for each step is shown in Figure 1 (Castiglioni et al., 2014).

Figure 1

The main steps in wastewater-based epidemiology and the data required for each step



Note. Modified from “Testing wastewater to detect illicit drugs: State of the art, potential and research needs,” by S. Castiglioni et al., 2014, *Science of the total environment*, 487, p. 615.

First, influent composite samples are taken from a regional WWTP for 7 days over a 24-hour period. These samples are then analysed for urinary biomarkers or measurable characteristics (EMCDDA, 2020). Depending on the drug type this is either the parent compound (MDMA, amphetamine, and methamphetamine) or the urinary excreted metabolite for cocaine (benzoylecgonine) and cannabis (THC-COOH; *ibid.*). It is not within the scope of this study to provide an outline of the analytical methods; however, it is to be mentioned that the most common analytical chemistry technique is liquid chromatography-tandem mass spectrometry (LC-MS/MS), a technique that “...combines the separation techniques of liquid chromatography with the analysis capabilities of mass spectrometry” (EMCDDA, 2020, p. 2;

for further explanation of the method, see Castiglioni et al., 2006). After chemical analysis, the third step in WBE is to normalize the estimated quantities of drug consumption in the population (Figure 1). The so-called back-calculations are performed using multiple important parameters (EMCDDA, 2016):

The back-calculation of drug consumption is performed by (1) calculating the daily sewer loads of target residues (g/day) by multiplying the concentrations of the measured target residues (ng/l) by the daily flow rates of sewage (m³/day); (2) estimating the total consumption by applying a specific correction factor, which takes into account the average excretion rate of a given drug residue and the molecular mass ratio of the parent drug to its metabolite...; (3) normalizing consumption by dividing daily values by the number of people in order to facilitate comparison among cities (mg/day/1 000 population); and (4) assuming a mean dose to obtain a value in doses/day/1000 population. (p. 17)

There are multiple uncertainties involved with every step taken in WBE (Castiglioni et al., 2013). As stated by the EMCDDA (2016), a mean dose needs to be assumed to obtain an estimate of the daily drug doses in the population. This is one of the greatest uncertainties when performing back-calculations as the ‘average’ consumed dose strongly varies depending on, among other factors, the purity of the drug consumed, route of administration (i.e., intravenous, intranasal, smoked, orally, et cetera), and the frequency of use (Castiglioni et al., 2014). Other uncertainty areas include systematic (e.g., inaccurate population size) and random (e.g., temporal changes) uncertainties (González-Mariño et al., 2020), the analytical measurement’s reliability (Castiglioni et al., 2013), collecting representative samples (EMCDDA, 2016; Tops & Tromp, 2019), and obtaining accurate excretion rates and thus correction factors (Feng et al., 2018; Zuccato et al., 2008).

2.2. Measuring different drug types

In general, the metabolite benzoylecgonine and the parent compounds amphetamine, methamphetamine, and MDMA are the most stable biomarkers (Ort et al., 2018). The extent to which accurate estimates of drug consumption can be quantified, however, does vary per drug type (for a global systematic review, see Zarei et al., 2020). One of the main uncertainties involved in WBE and relevant for this study is the stability of different drug metabolites and parent compounds in influent wastewater (Castiglioni et al., 2013). In addition, the extent to which different drug types are excreted in urine— changed or unchanged— needs to be considered. For cocaine, depending on the route of administration (i.e., intranasal, intravenous) the excretion results from its most copious metabolite benzoylecgonine vary between 24 to 52%

(Castiglioni et al., 2013; Zuccato et al., 2008). For orally consumed amphetamine and MDMA, approximately thirty to forty percent is excreted in urine— however these excretion rates vary with the consumer’s urinary PH value, route of administration, and consumption dose (Pal et al., 2013; Boles & Wells, 2010). For methamphetamine, although partly metabolized (approximately four to seven percent), the drug is mainly excreted unchanged in urine i.e., the parent compound (Bramness et al., 2015). For cannabis (THC), approximately twenty percent is excreted in urine of which THC-COOH is the main urinary metabolite and the only suitable biomarker of consumption (Zarei et al., 2020). The metabolite is excreted in low percentages and dependent on numerous factors, including the consumer’s bodyfat, frequency of use, and route of administration (e.g., smoked, orally consumed, et cetera; Bijlsma et al., 2020). With cannabis the uncertainties not only lay in excretion rates but also in the analytical determination of THC-COOH in wastewater (for a full outline of WBE for cannabis use, see Causanilles et al., 2017; Bijlsma et al., 2020). Some drug types are thus more accurately quantified than others— with cocaine being the most accurate and cannabis the least (T. ter Laak, personal communication, February 17, 2021). Ort et al. (2018) thereby state that metabolites are preferred over parent compounds, because parent compounds in influent wastewater samples may also stem from drug production and/or dumping. Moreover, although drug waste from illegal production is increasingly well detected in influent wastewater samples there is still a chance for them to go unnoticed (EMCDDA, n.d.; Ort et al., 2018; van Laar et al., 2020).

2.3. Analysing small populations

Considering the scope of this study special attention should go to WBE for smaller populations. Ort et al. (2014) show that the daily mass loads of the targeted drug residues are subject to high variability when originated from small areas i.e., under ten thousand inhabitants. To successfully assess changes in consumption patterns larger sample sizes and more frequent measurements are required for estimating annual means— specifically when it comes to high-prevalence drugs in small communities. For example, they found that annual mean estimates from one-week periods resulted into sixty percent relative errors, whereas a ten percent error would be considered optimal (ibid.). Unfortunately, there is no other literature— to my knowledge— that addresses the analysis of small populations in specific.

2.4. Epidemiological critiques

Although WBE is in full development as a scientific field and becoming increasingly more reliable, a fixed uncertainty degree remains in the parameters involved. Another important aspect to consider is the concerns raised by drug epidemiologists— the foremost critique being the fact that WBE does not provide information on contextual factors (Lancaster et al., 2019a;

2019b; van Laar et al., 2020; Trimbos, n.d.b). It remains unknown who the drug users and what their usage patterns are (ibid.), as it is e.g., unclear what users' age, sex, socio-economic status, and history of drug use is (Been et al., 2016). Because WBE is used to estimate *quantities* of drug use in the population it does not provide the crucial information needed for policy makers on drugs and drug use patterns (Lancaster et al., 2019a; 2019b). Been et al. (2016) also mention WBE as a complementary method because traditional monitoring tools are necessary to ensure befitting drug policy. Another concern is the extent to which drug mass loads as detected in wastewater are rightfully attributed to the target population (van Laar et al., 2020; T. Nabben, personal communication, January 8, 2021; M. Buster, personal communication, February 16, 2021). Taking thereby into account the research from Ort et al. (2018), the question arises how non-resident drug use (e.g., from (nightlife) tourists and visitors) contributes to the target population's wastewater— not everyone that uses the bathroom in a municipality is an inhabitant of that municipality. To illustrate this, WBE research conducted prior and during the covid-19 pandemic in the Dutch city Amsterdam showed significant reductions in cocaine, amphetamine, and MDMA during that time, which could be explained by the drastic change in tourists' mobility and behaviours because of travel and pandemic restrictions (KWR, 2020b).

2.5. Data triangulation for Dutch municipalities

One aim of this study is to investigate the extent to which municipal WBE outcomes accurately reflect the target population's drug use. To attain to this aim it is both needed to conduct a literature review on WBE and to perform data triangulation of municipal WBE data with established drug monitoring tools. It should be noted that the latter has proven itself unfeasible, because of two reasons: first, this study's literature review highlighted the number of uncertainties involved with every step in the back-calculation process, which leaves it impossible to make accurate comparisons with other monitoring tools. This aligns with the work from other researchers who opted for a similar taxation and arose to the same conclusion (Tops & Tromp, 2019; M. Buster, personal communication, February 16, 2021). Second, comprehensive data on regional drug use is often unavailable. In contrast to urban cities are rural areas scarcely represented in drug research (Nabben & Korf, 2016; Korf, 2010), which leads to a lack of prevalence data and user group statistics that are needed to make valid comparisons.

2.6. In short

WBE is thus utilized for estimating population consumption and relies on several uncertain assumptions— the greatest one being the 'mean dose' (Castiglioni et al., 2014). In addition, only the drugs of which the urinary biomarker is a metabolite (i.e., cocaine and cannabis) can be ascribed to consumption. Drugs that are measurable via their parent compound (i.e.,

MDMA, amphetamine, and methamphetamine) may also stem from drug production and/or dumping (Ort et al., 2018). It is thereby even more difficult to obtain a reliable mean estimate for smaller populations (Ort et al., 2014), and the extent to which tourists and other visitors contribute to the municipality's WWTP remains unknown. Unfortunately, the WBE research outcomes from several Dutch municipalities cannot be validated due to these uncertainties and due to a lack of comprehensible prevalence data on a local level. Lastly, WBE cannot be utilized as a starting point for befitted drug policy as it does not provide any contextual information on drug users and drug use patterns (Lancaster et al., 2019a; 2019b).

3. Sketching the discourse

3.1. The drug debate: harm reduction versus zero tolerance

The term 'zero tolerance' has become a well-known feature in the realm of crime control (Newburn & Jones, 2007). Starting in the 1990s under Reagan's administration, zero tolerance gained ground during the U.S. 'War on Drugs'— a series of harsh anti-drug policies aimed at law enforcement and punishment (ibid.). This prohibitionist approach towards drug policy has spread internationally, including The Netherlands. In general, Western society's depiction of drug use is that of a social and/or political problem that lays at the centre of the harm-reduction versus zero-tolerance debate (Zajdow, 2005). According to proponents of the zero-tolerance side, drugs are inherently bad for individual users and the community, thus believing that drugs always pose a risk on anyone and therefore the risk should be eliminated completely (Duff, 2003). On the other hand, proponents of the harm-reduction side adhere to the more practical principle of acceptance, meaning that drug (ab)use is and will stay prevalent in society and therefore the focus should lay on reducing the harms associated with (Single, 1995). Although many public policies are aimed to reduce the harms associated with e.g., tobacco and alcohol, traffic and food safety, and other areas in which the human behaviour is questioned yet not prohibited, harm reduction as a public health element in drug policy continues to be dominated by the prohibitionist drug discourse (Csete et al., 2016). Several scholars have shown the ineffectiveness of such a discourse (Buchanan & Young, 2000; Caulkins, 1993; Voas et al., 2003; Skiba, 2014; Skiba & Rausch, 2006). Zero-tolerance driven policies are paradoxical— they are presented as a necessity for public health, yet evidence suggests the contrary (Csete et al., 2016). Not only does the enforcement of prohibition and stigma pushes drug users away from health services, but it also disproportionately affects marginalized people i.e., the poor, ethnic minorities, and women (Godlee & Hurley, 2016; Skiba & Rausch, 2006). This is also witnessed in The Netherlands where the hardening of the drug debate resulted into stricter addiction care and increased perception of stigma on drug use and abuse (de Gee & van der Gouwe, 2020).

3.2. Drug policy in the Dutch context

In short, the Dutch drug policy is two-tracked— it aims to counter the supply of illegal drugs by a tough criminal-law approach whilst also limiting drug use-associated risks as much as possible by offering medical and social assistance to drug users (de Kort, 1995). Starting in the 1970s, Dutch law and policy changed from punitive prohibition into a model based on harm-reductive measures (de Gee & van der Gouwe, 2020). In terms of legislation, the rise of heroin and an increase in cannabis use among the youth, together with a dormant approach towards cannabis-selling in community centres, and the upswing of illegal ‘house-dealers’ have led to a change in the Dutch *Opiumwet* or Opium Law in 1976 (van den Brink, 1998; Rijksoverheid, n.d.). Different drug types were categorized based on their associated risks, meaning an *Opiumlijst I* for hard drugs (i.e., heroin, cocaine, and amphetamine) and *Opiumlijst II* for soft drugs (i.e., cannabis). Moreover, cannabis use was now formally decriminalized (ibid.). In terms of drug policy, the spreading of HIV and AIDS among heroin users in the 1980s significantly declined with the harm-reductive measures taken (i.e., syringe exchange and provision of methadone; van Solinge, 1999). In the second half of the 1980s, ecstasy (MDMA) became increasingly popular (Nabben, 2010). Users of the party drug were able to get their pills tested by prevention workers which ensured safer drugs and drug use. Drug policy has become a prime responsibility for the Ministry of Health now that the drug problem is seen as a societal and public health issue (van Solinge, 1999).

Although internationally The Netherlands have long been known for their successful harm-reductive approach to drug issues, the Dutch *gedoogbeleid* or toleration policy is up for discussion and gradually transitioning into a zero-tolerance climate (de Gee & van der Gouwe, 2020; Korf, 2010; Nabben, 2010). This goes together with— if not follows from— the shifting political debate towards morality and conservativity (Korf, 2010). Repressive measures now go beyond the supply of illegal drugs but focus *de facto* on small dealers and users (ibid.). Justice and law enforcement become more and more intertwined with the domain of national health (de Gee & van der Gouwe, 2020). For the Dutch and in the early 2000s in specific, the notion of tolerance became a notion of crime control and the margins of the two-tracked approach (i.e., repressive measures against drug trafficking and health measures against drug users) narrowed further (Nabben, 2010). Korf (2010) critically and cynically mentions that now drug crime markets have been successfully discovered and the fight against hard drug supply in the big cities has largely settled, the focus has now been put on the fight against drugs in nightlife and rural areas.

3.3. Drug use in Beck's society of risks

One way to theoretically explain this tendency towards risk management is by Beck's depiction of the 'risk society' (1992). According to Beck (*ibid.*), the postmodern world is a risk society, meaning that it is now occupied with the prevention and minimization of risks that it paradoxically has produced itself. Where it was once thought that the increasing scientific and technological knowledge would help to abate all risk, it rather shows to increase it: not only are we now able to detect risks that we were not aware of before, but we are also creating new risks in the process of trying to control for them. Beck thereby distinguishes hazards (i.e., naturally occurring events, like earthquakes) from risks (i.e., products of conscious, human decision-making, like pharmaceutical drug side-effects), because hazards *occur* and risks are *produced* (Jarvis, 2007). For example, Møldrup and Morgall (2001) put the risk of modern drugs in society against Beck's theoretical framework. They show with the case of Prozac i.e., the psychotropic drug fluoxetine that the risks associated with modern drugs are "...induced by socially constructed technological artefacts and are capable of producing risk on an objective as well as on a non-objective global level" (*ibid.*, p. 72).

In a risk society, all risks— including those for individuals— are aimed to be controlled for and are increasingly institutionalized (Beck, 1992). They have been given centre stage; within the risk discourse each person is ought to be prudent as they themselves are responsible for their own destinies (Rose, 2000). Both sides in the drug-policy discussion— zero tolerance and harm reduction— rely on the dominant principle of risk, albeit with a different risk-management strategy: one opts to eliminate all risk by diminishing all drugs and the other tries to minimize risk by controlling for safe(r) drug use. Whereas the harm-reduction notion puts focus on institutionalized individual responsibility (Collins, 2011), the zero-tolerance notion can rather be depicted as an ideological effort to eliminate all drug-use related risks itself has produced. This also explains the increasing dominance of the prohibitionist discourse in the current drug policy debate (Zajdow, 2005, p. 197): "zero-tolerance as a metanarrative of harm reduction is an attempt to deal with ambivalence by becoming rigidly technocratic and oriented towards risk management." If the continuum of scientific development stemming from scientists and experts inherently produces new risks whilst trying to contain them, then we better should not take any risk and— paradoxically— try to eliminate all.

3.4. The role of the media

3.4.1. The role of the media in public and drug discourse

According to Beck, risks are socially constructed in public discourse (1992). Although his work is rather underdeveloped and takes on contradictory positions on the media (Cottle, 1998), Beck

foremost identifies it as the key arena in which risks are played out. He emphasizes the role (i.e., power) of the media and its discourse in the amplification of such risks (Beck, 1992):

[Risks] can thus be changed, magnified, dramatized, or minimized within knowledge, and to that extent they are particularly *open to social definition and construction*. Hence the mass media and the scientific and legal professions in charge of defining risks become key social and political positions. (p. 22)

More recent research by Lancaster et al. (2011) show four different mechanisms by which the media has the power to influence public and drug discourse. The news media can (i) define public interest and set the agenda; (ii) frame issues through selection and salience; (iii) indirectly shape people's risk attitudes; and (iv) feed into debate and political decision-making (ibid.). The media thus decides on which bits of information are presented in the news and by which narrative or frame these are represented in. Entman (1993) clarifies how political power is exercised through the framing process of selection and salience. The ways in which certain problems are pinpointed highlight how some pieces of information are depicted over others and how the media plays a significant role in the public's understanding of a social problem, their risk perception of the social problem, and the coherent discourse (ibid.).

Whereas experts can analyse risks, the public builds their understanding of social problems on the cultural processes in which the media occupies a key position (Blood et al., 2003). In general, the media's reporting on drug issues has been frequently criticized for being sensationalized, biased and narrow (Ayres & Jewkes, 2012; Hughes, 2011; Rawstorne et al., 2020; Coomber et al., 2000; Hendriks Vettehen et al., 2005; Taylor, 2008), including frames of drug users as addicts, criminals, and depictions on morality (Goode & Ben-Yehuda, 1994; Boydston et al., 2013). The ways by which the media portrays drugs and drug users is known to shape public perception and drug policy (Belackova et al., 2011). For example, the War on Drugs and zero-tolerance notion translate into the often-seen law-and-order frame i.e., media portrayals of drugs within the focus of law enforcement, punishment of drug suspects, and government officials as spokespersons (Boydston et al., 2013). Watts (2003) argues that by doing so the media (sub)consciously reinforces prohibitionist tendencies towards drug users.

3.4.2. Drug scares, moral entrepreneurs, and moral panics

An exemplification of how Beck's risk society interlines with the news media's drug-specific framing is the 'drug scare' (Reinarman & Levine, 1997; Forsyth, 2012; Beck, 1992). Drug scares are socially constructed and dramatized risks that follow a familiar pattern. Their focus lays on a moral dimension by which individual and tragic cases are exemplified in the media which in turn leads to heightened public concern (Forsyth, 2012). First, a new drug concern arises and is

considered newsworthy. Second, the drug concern reaches the mainstream press and is constructed as a problem, leading to disproportionate reporting of subsequent stories and a news-story peak. Next, the media starts campaigning against the drug and offers stage to politicians, researchers, and moral entrepreneurs that demand legislative response (Forsyth, 2012; Forsyth 2001; Reinerman & Levine, 1989; Reinerman & Duskin, 1992). Coined by sociologist Becker (1963), moral entrepreneurs are the people (individuals, groups, or formal institutions) that exhibit the power to campaign for the outlaw of certain deviant behaviours; they are the people that take lead and set the agenda.

Moreover, moral entrepreneurs have the power to generate moral panics (Cohen, 1972). The concept ‘moral panic’ is first initiated by Cohen with the work ‘Folk devils and moral panics’ (ibid). Cohen analysed the criminal or anti-social behaviour of several youth cultures and found that, although the behaviours are rather trivial, the panic that surrounded these behaviours was mostly exaggerated (Marsh & Melville, 2011). Drug scares and moral panics can both be seen as a process of drug framing, however as opposed to moral panics are drug scares proposed as a consequence of *deliberate* rather than *accidental* news manufacturing (Forsyth, 2012; Cohen, 1972). Moral panics are often “...perpetuated by the news media, fuelled by politicians, and often result in the passage of new laws or policies that target the source of the panic” (Crossman, 2019). In this way, moral panics can foster increased social control (ibid.). To quote his classic definition (Cohen, 1972):

Societies appear to be subject, every now and then, to periods of moral panic. A condition, episode, person or groups of persons emerges to become defined as a threat to societal values and interests; its nature is presented in a stylized and stereotypical fashion by the mass media; the moral barricades are manned by editors, bishops politicians and other right-thinking people; socially accredited experts pronounce their diagnoses and solutions; ways of coping are evolved (or more often) resorted to; the condition then disappears, submerges or deteriorates and becomes more visible. (p. 9)

Moral panic refers to the widespread and often irrational fear that someone or something is a threat to the status quo; the values, safety, and interests of society at large are found to be under attack (Cohen, 1972). As opposed to Forsyth (2012) who proposes that drug scares are distinctive from moral panics, Fredrickson et al. (2019) rather argue them to be a subcategory of moral panic— a line of thought that is also adopted in this study. They stress the cumulative weight of drug framing in general (ibid.); although drug scares are all considered to be singular episodes, they add to the ongoing process of heightening the risk perception of drug use (Fredrickson et al., 2019; Linnemann, 2010).

3.5. An integrative theory of moral panics in Beck's society of risks

A critical analysis from Ungar puts the concepts moral panic and risk society against another (2001). Ungar (*ibid.*) states that the questions behind moral panic research have lost much of their usefulness because of the concept's narrow conceptualization; where panics are designated as time-to-time events, the risk society is characterized by a stream of emergencies. Yet, it is within a risk society where moral panics thrive (Hughes et al., 2011). Individuals that engage in 'risky' behaviour in a world preoccupied with risk management become society's deviants. They are a threat to societal interests and are held accountable for their 'choosing' to go against the universal rule of conduct. 'Being at risk' thus becomes a moral failure that needs to be controlled for (Lupton, 1993). In line with this assumption is the work of Miller (2006), who states risk and morality to be merged (*ibid.*):

Moral panics become means of dealing with risk society via appeals to "values," a displacement from socioeconomic crises and fissures. They both contribute to, and are symptomatic of, risk society. But rather than being mechanisms of functional control that necessarily displace systemic social critique onto particular scapegoats, moral panics have themselves been transformed by the discourse of risk society. (p. 312)

Moral panics i.e., drug scares and the risk society share a complementary nature that resonates within the field of drug research. Whether about cannabis (Bright et al., 2013), ecstasy (Koesters et al., 2002; Rosenbaum, 2002), mephedrone (Alexandrescu, 2014), heroin (Denham, 2008), or methamphetamine (Murakawa, 2011; Weidner, 2009); there is a bulk of scientific literature that shows the occurrence of moral panics on drug use in media discourse. Other literature for example illustrates how the War on Drugs and zero-tolerance notion are an outcome of drug-related moral panic (Vitiello, 2020; Schack, 2011; Hawdon, 2001). Either way, the news media fulfils a key figure in the dissemination and reproduction of societal values and interests—inhibiting the social and political position in the risk perception and panic creation on drugs in contemporary society.

4. Methods

The current study has three aims, namely to (i) investigate the extent to which WBE accurately detects and monitors population drug use in Dutch municipalities; (ii) critically analyse the news media's reporting on WBE in Dutch municipalities; and (iii) provide recommendations for future policy and research. The purpose of a concurrent triangulation approach is to use both quantitative and qualitative data to define the problem of interest more accurately (Creswell et al., 2003; Castro et al., 2010). The news media's discourse about municipal WBE studies cannot be critically analysed without investigation of the method's technical aspects first. Moreover,

analysing both elements offers opportunity for comprehensive policy and research recommendations, hence a mixed method approach is the most befitted means to attain to this study's research aims. A quantitative literature review on the method WBE is already provided. In the following sections the qualitative approaches to inquiry (i.e., critical discourse analysis and expert panel, see Section 4.1. and 4.2.) are outlined.

4.1. Critical discourse analysis

4.1.1. Theoretical approach

Critical discourse analysis (CDA) is the approach to analysis employed in this study. The approach interlines with the functionalist definition of discourse, meaning that language (re)produces social life and (re)produces social problems (Richardson, 2007; Johnstone, 2008). Discourse is thus seen as a social and not a mental phenomenon— it puts focus on the fundamental concepts that underly language and views them as problematic and in need of investigation (Schiffrin, 1994). According to Fairclough (1992), no language is value-free and texts therefore need to be viewed from their socio-historical and political context. Every linguistic choice is a strategic choice (i.e., has an epistemological agenda) of how to explain the world (Johnstone, 2008). This includes choices on how to represent actors, actions, and events (ibid.), or within the specific case of this study, how drug users, drug use, and municipal WBE studies are exemplified by the news media. The way by which the media present certain 'truths' thus shapes public and drug discourse (McMullan, 2005).

Journalism i.e., the news media has three entangled characteristics: language, production and consumption, and its relation to social ideas and institutions (Richardson, 2007; Fairclough, 1992). CDA focuses on these three elements by examining the role of discourse in the (re)production of a social problem— specifically from the perspective of power relations and dominance (Schiffrin, 1994). An important notion is that of social power through hegemony; about how the status quo is reflected within texts without people realizing it (Johnstone, 2008). According to Richardson (2007), the overarching goal of CDA is to link linguistic analysis to social problems by critiquing and analysing how social power is both represented and reproduced in the news. Hence, CDA is an often-used approach when examining the news media (for an overview, see O'Keeffe, 2011), and specifically the news media's representations of crime and social control issues i.e., drug use (Cohen, 1989; Richardson, 2007). CDA is thus not so much concerned with language use in textual analysis *per se*, but with the "linguistic character of social and cultural processes and structures" (Richardson, 2007, p. 26). This also means that the internal structure of a text can only be understood in context of the social world and with positioning in social theory (Luke, 2002).

4.1.2. Data collection

Keeping in mind the drawbacks of traditional news archives (Wheeler & Wang, 2015; Weaver & Bimber, 2008; Justiss, 2011), yet also considering the practicalities valued for this study all news articles included in analysis were derived from LexisNexis (LexisUni). Criteria for inclusion were print-version and offline news articles from the Dutch news media that reported on municipal WBE studies between 2011 and 2021. Search terms included ‘*rioolwater*’ (wastewater), ‘*rioolonderzoek*’ (sewage research), ‘cocaine’, ‘*amfetamine*’ (amphetamine), speed, ‘*methamfetamine*’ (methamphetamine), ‘crystal meth’, ‘ecstasy’, ‘xtc’, ‘MDMA’, ‘cannabis’, ‘THC’, and ‘drugs’ which resulted into a total of $n = 353$ articles. Further inspection of these articles showed that many of them did not benefit the scope of this study, resulting into a remaining $n = 135$ articles. Articles were excluded if they (i) did not mention municipal WBE studies or did not have municipal WBE studies as the core subject, (ii) reported solely on international comparisons, (iii) reported on WBE as a means of detecting virus particles (e.g., coronavirus), or (iv) reported on location specific WBE studies (e.g., festivals). It should be noted most of the news articles included in the final sample stem from local news media and reflect somewhat altered versions of the same stories yet are distributed through several newspapers that fall under the same media corporation. A similar pattern of data homogeneity is also found by McLean (2017), who argues this type of repetitive, regional news coverage as an amplification of the discursive power of certain messages.

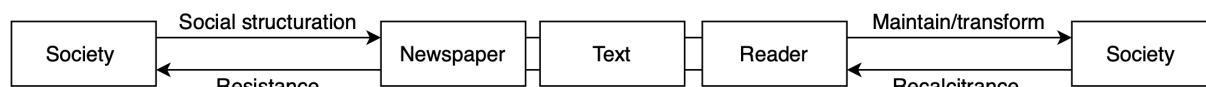
4.1.3. Analytical approach

NVivo 12 software was employed to process the qualitative data, to obtain rigor (i.e., trustworthiness), and to work more methodically (Maher et al., 2018). Fairclough’s much-valued model of CDA was chosen as the approach to analysis (1992; Richardson, 2007). According to Fairclough (1992), one should conduct a CDA according to the circular process of three dimensions: text, discursive practice, and social practice. However, because of the notion that CDA does not focus on the linguistic form per se and because textual elements (e.g., grammar and semantics) were not within the scope of this study emphasis was put solely on in-text themes and patterns that relate to wider social problems and representations i.e., social practice (Figure 2). In practice, this means that insights from the discourse analysis are expanded into relation with the wider society and are subjected to critical analysis, hence the term critical discourse analysis (Richardson, 2007). First, the sampled newspaper articles were read without any specific questions in advance. This was done to grasp the overall *corpus* of news articles and to gain a sense of possible themes and patterns. Second, a conceptual framework was developed to provide theoretically sound guidelines in coding. These acted as a guideline but were not a

guiding principle given that WBE in the news media had not yet been studied. Themes and patterns in media discourse on drug use as found in literature were included i.e., sensationalism (Ayres & Jewkes, 2012; Hughes, 2011; Rawstorne et al., 2020; Coomber et al., 2000; Hendriks Vettehen et al., 2005; Taylor, 2008), addiction, crime and deviance, and morality (Goode & Ben-Yehuda, 1994; Boydston et al., 2013; Cohen, 1972; Miller, 2006). Third, manual coding was carried out based on the latter. A back-and-forth iterative process of manual coding (i.e., encoding and recoding) and checking, refining, and adapting theory was employed throughout the process of analysis.

Figure 2

Visual representation of critical discourse analysis (i.e., social practice)



Note. From “Analyzing newspapers. An approach from critical discourse analysis,” by J. E. Richardson, 2007, London: Palgrave Macmillan, p. 42.

4.2. Expert panel

4.2.1. Theoretical approach

Between February and June of 2021, several experts from various drug policy-related fields were invited to partake in an expert panel (i.e., focus group) to formulate tangible recommendations for future policy and research. Focus groups are often held during the exploratory phase and are a useful tool for mixed-method studies (Barbour, 2018). Since WBE is a new and developing field the view of other scientist and experts in the field is of great value; they offer parallel data and facilitate the interrogation of contrasting datasets— particularly when trying to explore any discrepancies (ibid.). The theoretical approach as adopted in this study is the Delphi method (Crisp et al., 1997; McPherson et al., 2018); different experts comment on the study results via focus-group discussion. This makes Delphi-groups particularly suited for policy questions and research (Bloor et al., 2013).

4.2.2. Participant selection

To ensure a spread of experts and to ensure the inclusion of people with drug policy and/or research expertise participants were recruited via maximum variation purposive sampling. A set of criteria was developed prior recruitment to reduce any researcher’s bias (Barbour, 2018), which included the following: (i) all participants needed to have demonstrable experience and knowledge in their field of expertise; (ii) all experts needed to share a common ground in drug policy and/or research to encourage discussion (Bloor et al., 2001); (iii) although similar backgrounds, participants’ attitudes should differ in order to ensure ‘bite’ in the discussion

(Morgan, 1988); and (iv) for the fields of drug, health, and sewage-based epidemiology at least one expert should be included. Possible participants were recruited via Google search, through organizations, and/or advised by the internship supervisor. An invitation email (including information on the master's thesis) was sent out to several experts ($n = 10$). In accordance with the guidelines as proposed by Barbour (2018), no more than eight participants were included in the final sample. The final participant sample ($n = 7$; 57% male) was based upon criteria (i)–(iv).

4.2.3. Ethical considerations and procedure

This study has been conducted in congruence with ethical principles and was approved by Utrecht University's Ethics Committee. An information letter (including informed consent form) was sent out via email. All participants were at least eighteen years old, had time to ask questions prior and during participation, were aware of the possibility to stop at any given time without consequence, that they were video recorded to ensure accurate transcription, and that their data will be treated confidentially. Both a synopsis of the research findings and a topic list were shared with participants *a priori*, which included three statements: (i) wastewater never lies; (ii) WBE is a good starting point for municipal drug policy; and (iii) WBE is stigmatizing for municipalities and/or drug users. These statements were designed as such to reflect this study's research aims and findings, to offer starting points, and to encourage discussion from multiple perspectives. Throughout the meeting the researcher's role was solely to guide and structure; not to partake in discussion (in awareness of reflexivity; Watt, 2007).

The meeting was held via Microsoft Teams and lasted about one hour. All participants gave formal consent before participation and were asked consent again online before the recording started. Since the aim was to carry out a content analysis and not to pay attention to the *minutiae of interaction*, *verbatim* transcripts are not necessary as this does not increase rigor (Barbour, 2018). Therefore, after re-watching the video tape only the sections of relevance were selected and fully transcribed with NVivo 12, which included comments related to and arguments for policy, future research, and communication of WBE results in specific. The videorecording was stored at the Utrecht University online server and deleted after transcribing.

5. Findings

5.1. Critical discourse analysis

The most prominent themes and patterns in the news media's reporting on municipal WBE studies are presented here. It is to be noted that all quotations and references are translated by default because the news articles taken into analysis as well as personal correspondences that are referred to were in Dutch. In total, 24 Dutch municipalities were mentioned in the news articles subject to analysis. These included not only municipalities that commissioned the KWR

to conduct a WBE locally ($n = 13$), but also the (often neighbouring) municipalities that decided not to do so or the municipalities of which certain spokespersons expressed interest in WBE in the future. For comprehensible reading an outline of these municipalities is given in Table 1. In addition, to avoid confusion in-text references to the articles subject to analysis are put in square brackets.

Table 1

Municipalities mentioned in the news media's reporting on WBE studies, The Netherlands

Municipality (yes)		Municipality (no)	
Beverwijk	Nijkerk	Haarlem	Stedebroec
Den Haag	Oudewater	Harderwijk	Texel
Enkhuizen	Volendam	Heerde	Velsen
Ermelo	Woerden	Hoeksche Waard	Zeewolde
Goeree-Overflakkee	Vianen	Hoorn	
Lopik	Sliedrecht	IJmuiden	
Nieuwegein		Putten	

Note. Yes = conducted WBE at time of reporting, no = did not conduct WBE at time of reporting. This information was gathered from the news articles subject to analysis.

5.1.1. Reporting on WBE research outcomes

5.1.1.1. Sensationalism

The study outcomes from municipal WBE studies are often reported in a biased, narrow, and sensationalized manner ($n = 76$), especially when it comes to the article's headings: "Ermelo turns out to be crazy about crystal meth," "Lopik's thirty-year-olds love to take a bump," and "Beverwijk's massively on cocaine and cannabis" [Koopman, 2018a; van Renselaar, 2018b; Bos, 2019]. Sensationalism in media discourse is a common concern as the media frequently employs a distortion of threat that contributes to heightened moral panic about drug use (Hughes et al., 2011; Beck, 1992; Cohen, 1972). An example of such a crisis frame i.e., drug scare is the 'meth scare' (Ayres & Jewkes, 2012; Boyd & Carter, 2010; Rawstorne et al., 2020), which illustrates the construction of methamphetamine as an urgent social problem in which its users figure as addicts and criminals. Although methamphetamine is not popular in The Netherlands and only prevalent within small subpopulations (van Laar et al., 2020), the few newspaper articles on municipal WBE studies that mention the drug sensationalize the issue with out-of-control examples from the United States [Koopman, 2018a; Koopman 2018b], references to the television series *Breaking Bad* [Koopman, 2018a], and referrals as 'a stimulating poison' [Reformatorisch Dagblad, 2018]. This sensationalized distortion of reality is also verified by the KWR (T. ter Laak, personal communication, February 17, 2021): "The

same goes for methamphetamine, that's quadrupled. We've gone from a very tiny amount to a tiny amount. It is very nuanced, but it is not presented that way [in the news media]. It just depends on who brings it.” It should be noted that, although narrow statements are witnessed throughout the entire timeline of reporting, more recent news articles leave room for criticism (i.e., lack of context) and nuance. For example, considering the detected methamphetamine in the municipality of Ermelo, one news article reported solely on the critique brought by the Trimbos Institute [Koopman, 2018b]: “... it is impossible to say whether the high concentrations of speed and meth come from consumption or production” and “It could even be that consumption has indeed gone up temporarily, for example— I'm just saying something— due to a group of large consumers from Amsterdam who were on holiday in Ermelo.”

5.1.1.2. Narrow and biased statements

The detected mass loads in influent wastewater do not always reflect actual drug consumption (Zarei et al., 2020; EMCDDA, 2020; Goulding et al., 2020; González-Mariño, 2020). Although WBE scientists stress the difference, the findings of this study show that the news media do not. The oversimplified and/or misleading ways in which WBE outcomes are reported on make it seem as if both are the exact same, abating nuance. For example, it was mentioned that “a sewage investigation calculates the average drug use for the total population of a city” and “The residents of The Hague do not seem averse to a ‘bump’. The sewage water in The Hague contains the largest amount of speed and cocaine in the Netherlands” [De Telegraaf, 2020; Metronieuws.nl, 2021]. Such assumptions are found throughout the corpus of news articles ($n = 69$ narrow or incorrect statements, including statements that overestimate WBE’s objectivity and accuracy). Moreover, most news articles did not name WBE indicators. The few numbers reported on were expressed in normalized mass loads per thousand inhabitants, although still ambiguous [Homan, 2016]: “On average, 275 milligrams of ‘loads’ were found per day, as the quantity is called, almost three times as much as in the city of Utrecht.” Here, the milligrams of detected amphetamine in Oudewater are put in brackets, however no further explanation nor context on these numbers was given. There is however one exception— all newspaper articles reporting solely on Volendam ($n = 7$; all fall under the same media concern) expressed the daily mass loads in daily doses i.e., ‘one bump per forty inhabitants’ and ‘1100 bumps a day’. Explanation nor nuance was provided on how these numbers were derived at. This applied to all the newspaper articles, not just the news media’s reporting on Volendam. Aside from overly simplistic reporting on the research outcomes are statements of this sort also found in explanatory quotations on the method, for example [Veluws Dagblad, 2012; Verhoef, 2016a]: “Scientific research makes it possible to measure how many drugs are used in a city. Samples

of sewage water are taken for a week, followed by an analysis of which drugs are contained” and “Whoever uses drugs pees out remnants that can be traced in the sewage water.” Clearly (but also expectedly), the complexity of the research process is not reflected within the news media’s reporting on municipal WBE studies, which ultimately increases the risk of faulty conclusions about the measurement, drug use(rs) and the municipalities enrolled.

5.1.1.3. Assuming the ones who use drugs

The news media systematically labels the entire municipality accountable for the detected mass loads in the wastewater e.g., “Beverwijk’s massively on cocaine and cannabis” and “...it remains a mystery why Nieuwegein’s inhabitants of all people sniff or swallow a pill more often” [Bos, 2019; van Renselaar, 2018a]. Even more prominent is the reoccurring pattern of attributing drug use to the local youth [Verhoef, 2016b; De Telegraaf, 2013]: “Young people in Lopik use an above-average amount of speed. An analysis of sewage water has shown this” and “When it comes to the use of the narcotic speed (amphetamine), the youth in Nijkerk is above all major European cities.” The relationship between drug use or social control issues in general and young people as the culprit of it all is everything except novel. Moral panics often evolve around the loose and degenerate in society (Cohen, 1972), and are merely about a small detail of the ‘real’ issue. In total, $n = 113$ references were identified that mentioned drug use in relation to the youth. These include— among other references— statements on problematic drug use and addiction ($n = 29$) and reasons for the youth to consume drugs (e.g., boredom, unengaged parents; $n = 42$). More recent articles started to show dissent, with the first ‘point of critique’ in 2013 [van Dijk, 2013]: “I am curious how the age, the number of users and the quantity can be determined based on sewage water. I await the report with interest.” In total, $n = 53$ references showed nuance, criticism or provided context in some sort of way, for example [Akinici, 2020]:

It is not certain that the extreme amount of speed use is entirely due to the youth. The investigation commissioned by the municipality concerns a study of drug residues in sewage water. From this you can deduce how much is being used, but not by whom. In addition, it remains unclear for the time being whether there is a relatively small group that uses a lot or whether there are many users.

Although the overall tone in the newspaper articles became more nuanced over time or started to at least show points of critique from health epidemiologists and/or local civil servants, the quotation as stated above was the only one that counteracted the assumption of the youth as the sole ones accountable for the detected drug loads in municipal wastewater. Occasionally, the adult population was also referred to as the municipality’s drug users ($n = 8$), however this generally followed from the assumption that the youth is the foremost drug user [Avontuur,

2016; van Renselaar, 2018b]: “Drug use is not only prevalent among the youth, but also among older residents of our municipality” and “Not only young people, but also people in their thirties snort, swallow, and smoke in Lopik.”

5.1.1.4. Comparisons as gauges

Another reoccurring pattern in the representation of municipal WBE study outcomes is that of national and international comparisons—the juxtaposition of small, rural municipalities against large, urban metropolises. Two examples include [Bosman, 2012; Homan, 2016]: “Volendam outperforms Milan, Paris and London in terms of drug use per capita” or “Compared to other European cities where measurements have been carried out, Oudewater is in the top five. The list is headed by Oslo (976 milligrams). It leaves cities like Antwerp (213), Helsinki (69) and Amsterdam (5) behind.” The question arises whether it is legitimate to make such comparisons. WBE does not allow to differentiate between occasional drug use by many people and more frequent, intense use by a smaller group within the population (Lancaster et al., 2019a). To illustrate this, Oudewater inhabits roughly 10.000 citizens as opposed to Amsterdam whose population rate exceeds 820.000 (CBS, 2019). One could imagine that a small group of locals that consume larger drug quantities would be enough to skew the averages— it takes significantly less people to get extreme values in smaller villages than it would for a large city. Statistically, a small number of drug users that account for the targeted drug residues in wastewater samples are prone to high variability and should therefore be subject to more frequent measures over extended periods and higher sampling frequencies (Ort et al., 2013).

5.1.2. A ‘good’ versus ‘bad’ measure

Although WBE is ought to be complementary to other drug monitoring tools (EMCDDA, n.d.), the news media rather provide a narrative in which both measures are put against each other. WBE is represented as the more objective and accurate drug monitoring tool and able to provide ‘hard’ data ($n = 34$), whereas population surveys are prone to bias and unreliability ($n = 17$) e.g., “It is the first time that municipalities determine their drug policy more objectively based on research into drug residues in the sewer system. Previously, drug policy was determined based on surveys” and “Annemarie van Wezel, professor of water quality and health in Utrecht, praises the sewer as a source for drug research: “No socially desirable answers are given”” [Verhoef, 2016; Greven, 2016]. The news articles subject to analysis presented no arguments for the contrary, however one news article showed the same statement made by KWR-researcher van Wezel, albeit with more nuance [Kuiper, 2016]:

...WBE is “an addition” to the current way of doing drug research, says Annemarie van Wezel, professor of water quality and health at Utrecht University and KWR-researcher.

There is little wrong with the traditional survey. It gives a clear picture of drug use among specific target groups, but there is also a disadvantage: respondents give socially desirable answers.

This example illustrates how the same statement made by the same spokesperson is reported on differently depending on the news media's framing through selection and salience (Entman, 1993), and thus on how to represent WBE by means of discourse. Because of this, the added value of survey measures (i.e., providing contextual information on drug use) gets dismissed completely. In agreement with Lancaster et al. (2019a), it was found that the manifestation of a 'good measure' versus 'bad measure' in media discourse about WBE refutes the focus from the contextual aspects of drug use that lay at the base of Dutch harm reduction policy to a zero-tolerance notion of which the aim is to reduce all demand-and-supply. For example [van Eijk, 2015]: "...the problem is much bigger because not everything is known by the police. "At the moment you have figures, based on that you implement policy, but there is still a whole layer below that we cannot find out"" and "A lot of data comes to the surface in one fell swoop. Where are the problems occurring and what drugs are they? Are illegal pills being used? Once we know what we are talking about, we can tackle it." Since WBE provides information on the quantities rather than the contextual aspects of the drugs being handled in a municipality the measure can solely be used to inform supply-reductive policies and not harm-reductive policies. Therefore, the news media's framing of WBE as a more reliable alternative rather than a complementary drug monitoring tool might be informed by and perpetuate an implicit political agenda.

5.1.2.1. Drug users are unreliable

WBE shows how objective scientific data is significantly privileged over self-report survey methods (Lancaster et al., 2019b). Moreover, with WBE's emphasis on objective and evidence-based data the measure contributes to the stigmatization of drug users (ibid.):

Here, the claim to 'accuracy' not only produces drug use as a particular kind of 'hidden' problem, but also in turn constitutes people who use drugs as lacking in knowledge and unaware (that is, as unable to reliably contribute the kind of accurate knowledge necessary for policy action). Constituting people who use drugs in this way has multiple potentially deleterious effects. The claim to accuracy reinforces and re-makes people who use drugs as mendicants and criminals, reproducing the stigmatizing subjectification effects in popular discourse about drugs. (p. 51)

This study's findings verify this. One reoccurring argument as found in the news articles subject to analysis is that population surveys for the monitoring of drug use are unreliable, because drug users themselves are deemed untrustworthy [Nederlands Dagblad, 2016]:

Trimbos¹, who also investigates drug use, cannot confirm the newest increase [in cocaine use]. But they do not investigate wastewater. Urine samples are honest as gold. Our excrement mercilessly lectures us. It's that simple. Incidentally, the reliability of this wastewater study puts studies based on what people say into perspective. People are often less honest than their pee.

Here, the assumption is made that people themselves are dishonest and therefore are not to be trusted. Other references are, for example [Noordhollands Dagblad, 2016; van den Oever, 2013]: “Stedebroec does not believe in conducting a survey among young people to map drug use, as the municipality of Hoorn intends. “Those young people can fill in anything”” and “There is a simple reason that the results differ, [Peter Schipper²] says. Ask an addict if they are addicted and you hear ‘no’ ...answers in surveys are not always honest.” All statements from individuals listed here are quoted verbatim in the news and no arguments are given for the contrary.

5.1.3. Crime and deviance

Media reporting on drug use is predominantly illustrated via a zero-tolerance discourse with emphasis on drug-deal arrests and an ongoing War on Drugs (Becket, 1994). This interlines with this study's findings that highlight the prevalence of crime and deviance as an eminent theme in reporting on municipal WBE studies. The most prominent were in-text references towards drug dealers, the War on Drugs, and punishment, for example [Dekker, 2019]: “...mayor Bram van Hemmen is first of all satisfied with the catch of the ‘dealer who supplied the village with this rubbish’, but he also emphasizes that he is not shocked by the discovery.” Another example includes a news article on the municipality of Stedebroec [Menger, 2021]:

A large shed for hemp cultivation was discovered in Stedebroec, mid-January. Five people were arrested, and the nursery was dismantled. "It's just crime," says Stedebroec mayor Ronald Wortelboer. “It makes a lot of money, and it undermines society. That is why this must be fought over and over again.”

In both articles the WBE outcomes functioned as an additional argument for the drug problem rather than being the main topic of reporting. In total, $n = 62$ references were found that present

¹ The Trimbos Institute is an independent research institute on alcohol, tobacco, drugs, and mental health in The Netherlands (Trimbos, n.d.a).

² Peter Schipper is a member of *De Overbrugging* (The Bridging), a non-profit foundation that aims to provide care for people who struggle with addiction problems in municipality Hoeksche Waard (De Overbrugging, n.d.).

municipal WBE studies within the law-and-order frame (Boydston et al., 2013). The textual analysis shows that the news media frequently turns to the Dutch national department of justice, police officers, councillors, mayors, and other civil servants as spokespersons and/or experts on local crime and WBE outcomes. Beckett (1994) found that the presence of state actors as primary spokespersons in media reporting on drugs highly associates with the presence of a law-and-order and social control frame. The media frequently highlights how drugs lead to destruction of society by conveying negative connotations surrounding drugs (Geçer & Mahinay, 2018). This is not without consequence as this leads to reinforcement of prohibitionist measures towards drug users (Watts, 2003). This study's findings show as such; aside from an emphasis on preventative measures— mostly from the perspective of moral entrepreneurs— the most frequent and optimal solution for the drug problem is one that focuses on punishment and law enforcement e.g., as mentioned by a councillor from the municipality of Goeree-Overflakkee [Berkelder, 2020]:

The question is whether prevention alone is enough. We think this is not the case. We need more parties to solve this problem. Enforcement must also play a role, for example. That you know, if you want to sell drugs, that it will be your turn at some point, because we don't accept that.

In total, $n = 70$ in-text references were found on drug policy. From those references $n = 42$ reflect preventative and/or harm reductive measures and $n = 28$ reflect prohibitionist measures.

5.1.4. Politics, religion, and interest groups

Not only tends the media attention for control issues (i.e., crime and drug use) to be foremost aligned with public concern rather than the actual magnitude of the problem, the media also tells us how to think of an issue— it sets the agenda (Lancaster et al., 2011). This study's textual analysis shows that the main reason for a municipality to engage in WBE is a heightened concern over local drug problems ($n = 50$). The foremost initiators as reported on by the news media are neoliberal and/or Christian political parties i.e., *CDA* ($n = 15$), *SGP/ChristenUnie* ($n = 10$), *VVD* ($n = 8$), and interest groups i.e., *Moedige Moeders*³ ($n = 18$) and *De Overbrugging*⁴ ($n = 3$). Inhabitants of a given municipality— mostly framed as the youth— are suspected of doing drugs, and a problematic amount of it. The often-reported underlying reason for WBE-initiators is therefore to provide 'hard data' to back-up already existing convictions on out-of-control drug

³ The Moedige Moeders (Courageous Mothers) is a Dutch interest group of mothers whose children suffer(ed) from addiction (Moedige Moeders, n.d.).

⁴ De Overbrugging is a non-profit foundation that aims to provide care for people who struggle with addiction problems the municipality of Hoeksche Waard (De Overbrugging, n.d.).

use [Kind, 2016; Reformatorisch Dagblad, 2012]: “The [drug] use is far too high and a real threat to [national] health (Councilor Ad de Regt)” and “The organization Moedige Moeders thinks that seventy percent of young people in Nijkerk use drugs, from a joint to heavy hard drugs. That is why the mothers had the wastewater in the Gelderland-town tested [for drugs].” WBE is thus politically used, often placed strategically behind the moral convictions of right-wing politicians, religious groups, and moral entrepreneurs. This is also verified by one of the researchers at KWR (T. ter Laak, personal communication, February 17, 2021): “I find those political choices difficult. It should be apolitical; it just has to be meaningful information on which to base policy.” In addition, the issue seems to be twofold (ibid.):

Municipalities with a strong Christian background are relatively more interested in it, there is either more [drug] use there or the community views it differently. There is also a different political landscape in these types of municipalities. There is often an urgency, either in enforcement or civilians, but there is also often a grain of truth in it.

Municipalities that show greater interest in WBE show to have heightened concerns over local drug use; either because there is greater drug use locally or because of moral and/or religious convictions. This not only leads to selection bias based upon which municipalities decide to engage in WBE, but also decides upon which municipalities are reported on by the news media. Hence, this leads to skewness in the representation of municipal WBE studies in both WBE literature and the news media’s reporting— fuelling the risk perception. In turn, this may lead to policy shaping that is mostly concerned with and based upon the perceived risk rather than the actual threat (Lancaster et al., 2011).

5.1.4.1. Setting the agenda: Moedige Moeders

Drug use is often framed as a problem and leads to heightened perceptions of risk, primarily because of how it is portrayed in the news (Lancaster et al., 2011; Entman, 1993). The Moedige Moeder show to be the foremost initiator as mentioned in the news media’s reporting on municipal WBE studies (n = 18). First initiated in Volendam, there are now *Moeders* (Mothers) in several Dutch municipalities, including for example Nijkerk, Putten, and Goeree-Overflakkee. They are the moral entrepreneurs who put WBE on the municipal agenda, criticize the municipality for not doing enough in terms of preventative measures, not wanting to acknowledge local drug issues in the first place, and not wanting the KWR to perform a WBE to ‘scientifically measure’ the drug problem. Moreover, they stress the inaccuracy of current prevalence data [De Telegraaf, 2013]:

Local Moedige Moeders have united in twenty other places. Bothmer⁵ on behalf of Nijkerk: “Our municipality sticks to the figures of the GGD, which indicates that only three percent of the youth uses drugs. We rather think of seventy percent.”

Moral entrepreneurs are the people in power that campaign against deviant behaviours and generate moral panics (Becker, 1963; Cohen, 1972). The Moedige Moeders do exactly that; they set the agenda and raise concern on out-of-control drug use and addiction among the youth. In addition, what became apparent from the newspaper articles is the existence of a culture of silence in rural areas— people prefer not to talk about drug issues in the country ($n = 19$). This is also stated by Korf (2010), who mentions that inhabitants of rural municipalities prefer to not talk to outsiders about local drug use, however the media always finds someone that wants to tell the story; hence, the overrepresentation of Moedige Moeders’ narrative in newspaper articles [van den Berg, 2013]:

Wilma Bothmer-van de Bunt (56) can sob a lot about it, but that doesn't help anyone either. She has a 31-year-old daughter who has been addicted to drugs for a long time and sees many young people around her dying from drugs. She regularly raises the alarm at politicians, but the response is very lukewarm, she thinks. She told how bad it is with the use among young people earlier this year in Nijkerk, on behalf of the organization Moedige Moeders, and very recently in Putten. “But in the end, it seems like the politicians just don't want to know how serious it is,” she says.

The media’s hunt for people who are willing to tell their story often leads to the Moedige Moeders’ representatives who have made it their aim to shed light on drug abuse (Moedige Moeders, n.d.). This also partially explains the emphasis on youth addiction in reporting— it is their perception that is translated in-text to readers which results into a story with a specific narrative; namely one that demonizes drug use and emphasizes threats to children by disseminating a fear discourse (Alexandrescu, 2014). Similar findings were already reported on years ago, McGaw (1991) for example found that children are often portrayed as the ‘drug victims’ in media discourse.

5.2. Expert panel

One aim of this study is to provide recommendations for future policy and research. Several experts from drug-related fields have come together to discuss the findings, identify the stumbling stones, and formulate solutions— some more tangible than others. The

⁵Wilma Bothmer is a frequently mentioned spokesperson of the Moedige Moeders in several news articles. In total, Bothmer’s name is mentioned $n = 37$ throughout the news media’s reporting on municipal WBE studies.

recommendations for policy, research, and dissemination of municipal WBE outcomes are presented in a factsheet (Figure 2).

Figure 2

Factsheet on expert-panel recommendations for policy, research, and dissemination

Expert panel
<p>There was one point of discussion that all experts agreed upon: WBE alone is not a suitable starting point for municipal drug policy. Consequently, a collaborative approach towards municipal drug policy is needed.</p>
Policy
<p>Collaborate with regional health care services. Every GGD throughout The Netherlands conducts an annual <i>Gezondheidsmonitor</i> (health monitor) with survey questions on population alcohol, tobacco, and cannabis use. If municipalities want to perform a local WBE to identify other substances in the wastewater than these must also be included in the regional health survey— this will ensure both context and hard data.</p>
<p>Make a policy plan. Municipalities that are interested in an improved drug prevention approach need to be counselled in a policy plan that involves all parties e.g., GGD, KWR, and addiction institutes. The focus should lay on a long-term approach and involves evaluation of the policy outcomes. Counselling should be embedded in a national or regional program that exceeds the municipal level e.g., Trimbos Institute.</p>
<p>Exclude drug dumping and/or production more accurately. Only the drugs from which metabolites are excreted can be accurately ascribed to population consumption. If a municipality wants to quantify population consumption of a drug that is only measurable through its parent compound a subsequent analytical measurement is required. Currently, this method exists yet is often not performed.</p>
<p>Conduct multiple measurements. To ensure reliability of the research outcomes repeated measurements are a necessity. Not only because of several uncertainty margins in the parameters involved when performing back-calculations, but specifically because of a lack of comprehensive prevalence data and smaller populations sizes per WWTP.</p>
<p>Exclude small populations from analysis. This study highlighted the analytical insecurities involved with the analysis of small populations. Considering population size, the focus should not lay on the number of inhabitants but rather on the number of households per WTTP. Therefore, municipal WTTPs connected to less than ten thousand inhabitants should not be taken into analysis.</p>

Research

Avoid any conflict of interest. Scientific research must always be encouraged, hence WBE should be conducted in areas other than Amsterdam, Utrecht, and Eindhoven. However, scientific development should not be dependent on which municipalities are willing to invest, also because this raises the question whether municipalities should be held accountable for the costs of such scientific research. Depending on the scope of the research different (international) funding programs should be considered, such as the NWO and VWS.

Conduct a pilot study. There is no golden standard in drug monitoring; wastewater-based and drug epidemiology must collaborate. Moreover, since WBE in Dutch municipalities is yet to be validated there is an additional need for complementary research. To create an integrative approach towards drug monitoring, a multi-year pilot study should be conducted in several municipalities.

Invest in the analysis of small populations. More research is needed on how to improve WBE for smaller populations, especially when the KWR wishes to analyse wastewater throughout The Netherlands. Whether such analytical inaccuracies e.g., high variability can be ruled out in the future needs to be investigated.

Dissemination

Adhere to the standards as proposed by the EMCDDA. For example, it is advised to specifically stress that there is a difference between the drug loads detected in wastewater and actual drug consumption; to make clear that the average drug consumption is an *estimate* and not the actual drug consumption; to triangulate WBE data with other drug monitoring tools, e.g., survey and crime data; and to provide special care in ensuring accurate communication with the media, since no best practice is established yet. Wastewater-based epidemiologists must always adhere to these standards. Moreover, due to additional challenges that come with the analysis of small populations extra caution in dissemination to the media and laypersons is necessary.

Make representative comparisons. Smaller and more rural municipalities should not be compared to larger and urban metropolises. Not only has this study shown the sensationalism of such comparisons, the value of these rankings is also debatable. To make valid comparisons with other areas and populations sizes is it important to be aware of any demographical and sociocultural differences between two units of analysis. Hence, to obtain credible comparisons Dutch municipalities can only be compared to similar areas.

Provide information via your own channel. To counteract the abated nuance in the news media's reporting, the KWR and other wastewater-based epidemiologists should communicate about conducted research via their own channels. In line with the EMCDDA's advice, it is important to be transparent about what is known and what is not, including any limitations the research might have.

6. General discussion

6.1. Reiteration of results

WBE radically changes the field of drug research. In contrast to expanding literature on the method's analytical aspects are there only a few researchers who have analysed WBE for its social and possible deleterious effects. To fill the knowledge gap, this study combined both

strands within a mixed-method approach towards WBE for Dutch municipalities and the subsequent news media's discourse. The sewage— indeed— does not lie. Problems arise however when the mass loads as detected in wastewater are translated into population drug consumption. The extent to which accurate estimations of population drug use can be calculated depends on several insecurities and assumptions, varies per drug type, and remains especially challenging for small populations (Castiglioni et al., 2013; Castiglioni et al., 2014; Ort et al., 2014; Ort et al., 2018). Yet, the nuance as required for such a sensitive analytical method vanishes in media discourse. It was found that the news media's reporting on WBE in Dutch municipalities befits the dominant drug narratives, including biased and sensationalised statements, the occurrence of drug scares, morality, and an emphasis of crime and deviance (Ayres & Jewkes, 2012; Hughes, 2011; Rawstorne et al., 2020; Coomber et al., 2000; Hendriks Vettehen et al., 2005; Taylor, 2008; Goode & Ben-Yehuda, 1994; Boydston et al., 2013). In addition, the news media provide a discourse in which the method is continuously privileged over traditional drug monitoring tools. WBE therefore becomes political; it serves as a tool to back-up moral convictions that interline with the prohibitionist discourse and (sub)consciously stigmatize drug users. This means that from a public health perspective WBE cannot be used as a sole guide in drug policy—collaboration between wastewater-based and drug epidemiology is crucial.

6.2. The role of the news media

Integration of the findings from both the literature study and critical discourse analysis shows a clear contrast between a need for nuance on the one hand, and a want for sensation on the other. According to Altheide (2004), journalistic interviewing in contemporary media culture has changed into an enterprise of entertainment. The news media's reporting of events serves for media attention and drama (ibid.), as an instrument for propaganda, and as a myth creator (Brownstein, 1991). WBE in most of these municipalities serves to do exactly that. It does not come as a surprise that the regional news media do not differentiate between detected drugs and drug consumption; let alone between metabolites and parent compounds. A normalized number for estimated population drug use in milligrams per day per thousand inhabitants remains flat without explanatory context. Such a figure is incomprehensible for those who are not experts. This inherently links to— if not causes— the sensationalized (inter)national rankings between small municipalities and large metropolises of which the sole value lays with the entertainment enterprise. Not only do these municipalities 'sell' because they are forgotten about, rural, and sometimes idyllic, but they also embody the reader's contradictory expectation of what a 'sin city' is supposed to be. As Beck states (1992), risk can be as real as one may think

they are, and both wastewater-based epidemiologists and the news media are key political positions in the public's risk perception on local drug use.

6.3. WBE, morality, and risk

Are we then dealing with a moral panic? This study's findings highlight how WBE functions as a catalyst in the ongoing moral debate on drug use rather than being the culprit of moral panic itself. Based upon Cohen's depiction of a moral panic (1972), the emergence of WBE in Dutch municipalities indeed led to stereotypical and fashionable media and drug frames, and yes, the moral barricades are manned by right-thinking people, just as experts are also involved and consulted for their solutions and diagnoses on local drug use. Yet, WBE itself is not the threat to societal values. Instead, it is a tool in the risk-management kit from moral entrepreneurs, utilized in their fight against drug use—specifically that of the youth. Instead of being depicted as deviants (Lupton, 1993), young people are constructed as victims. Morality has thus become a means of risk management via the externalization of deviant behaviour: the youth must be protected for drugs may turn everyone's children into addicts and criminals. The youth is often perpetuated as being 'at risk' (Mitchell et al., 2001). Elaborately, Douglas states the following (1990, p. 7): "To be 'at risk' is equivalent to being sinned against, being vulnerable to the events caused by others, whereas being 'in sin' means being the cause of harm." It is thereby hardly a coincidence that most of the municipalities as mentioned in the news media are part of the conservative bible belt (i.e., an indication for a wide strip that runs through the Netherlands in which relatively many Reformed people live). Some of these municipalities have stoically manned the moral fort around drug use for years (Korf, 2010).

According to Beck (1992), the political debate is no longer monopolized by risk professionalism and thus offers room for morality and conservativity to take stage (1992; Garland, 2018; Korf, 2010). Within the risk society a direct relationship exists between the knowledge of laypersons and experts (Garland, 2018, p. 26): "the more the public learns about science, the more it realizes that science is fallible, provisional, always subject to doubt and revision." This— together with the cumulative experience of poor risk management— produces a distrust in scientists and governmental bodies which in turn results into increased public engagement (ibid.). It is for this reason that morality and risk are inherently intertwined within the scientized society. Not only are the Moedige Moeders advocating against youth drug addiction and abuse based on their personal expertise i.e., risk management, but they have also stated distrust in existing population surveys because of this lay knowledge. In the risk society, an increase in the visibility of scientific-expert knowledge from the public's view has come with an increase of their scepticism, specifically when there is competing knowledge available from

other experts (Garland, 2018). As such, the Moedige Moeders have put WBE on the municipal agenda; finally, there is opportunity for them to find the ‘truth’ with ‘objective’ and scientific data.

6.4. WBE, politics, and drug policy

WBE thus becomes political; right-wing, religious, and other interest parties utilize the method as a solidification of their prohibitionist moral convictions on drug use. In addition, one could argue that WBE *is* political— after all, scientific activity is never value-free (Hanks, 2009). For example, it is by design that WBE cannot be utilized for harm-reductive purposes as it solely quantifies population drug use and gives no information on the contextual aspects that such policies rely upon. This is not an issue on itself; however, it becomes one when the method is both utilized for and presented on incorrect premises. It is not without reason that scientists stress the complementary (and not substitutive) nature of WBE to other means of drug monitoring— it simply provides other data. Nevertheless, wastewater-based epidemiologists take the analytical challenges of survey measures and apply them as a yardstick as to why WBE is the better means of monitoring. WBE is for instance thought to be less expensive, noninvasive, and more objective (Zarei et al., 2020; Zuccato et al., 2005; Castiglioni et al., 2014; Feng et al., 2018). Not only tends the news media to copy this narrative of a ‘good versus bad measure’, but it also perpetuates the impression that WBE is indeed the ‘better’ choice. This is faulty for two reasons. First, where WBE for the major cities Amsterdam, Utrecht, and Eindhoven is proven reliable, WBE for Dutch municipalities is not— the WBE outcomes often cannot or have not been validated, and the method fails to ensure reliability through boundary conditions such as suitable population sizes and repeated measurements. Second, WBE cannot be used as a sole starting point in befitted drug policy. As Lancaster et al. (2019a) state, the method shifts the focus away from harm reduction in the drug-policy discussion to a more punitive and narrow aim of drug-use reduction. This tendency towards a prohibitionist discourse in drug policy has, as discussed, negative and paradoxical effects for public health (Csete et al., 2016).

6.5. Limitations of this study

The mixed-method approach towards municipal WBE studies offered a comprehensive investigation of the problem and provided coherent policy solutions, yet there are limitations. First, due to the scope of this study as well as the researcher’s background in social sciences not all technical aspects of WBE were included. Although the main findings were tested against expert opinion, WBE has not been the foremost field of expertise; future research should therefore happen in collaboration between both fields to ensure integrative and cumulative knowledge.

Second, most articles included in the final sample stem from the local and/or regional news media. Belackova et al. (2011) show that local journals are (as opposed to serious journals) twice as likely to publish drug-related articles, more likely to frame drugs as a social and criminal problem, more likely to refer to the youth, and three times as likely to mention locally arranged prevention campaigns. Although this study successfully assessed the news media's discourse about municipal WBE studies, a broader scope of newspaper articles can help to situate the more general discourse about WBE. Future textual analysis of the news media's discourse about WBE should therefore include articles on the major cities Amsterdam, Utrecht, and Eindhoven, and consider cross-national comparisons.

Third, although the experts enrolled in the focus group were representative of the Dutch drug policy and/or research field, I did not anticipate on a possible skewness in drug discourses. Most panel members viewed the drug problem from a harm-reductive public health perspective and were therefore sceptic of WBE's current role in drug policy, causing one of the participants to feel that they at times had to defend their field of expertise. Future research might address the issue by an increased number of participants from wastewater-based epidemiology, yet it should also be noted that the expert panel merely reflected what this study has highlighted throughout.

7. Conclusion

“One references prudence, the other scapegoating— with the media a hinge between them” (Miller, 2006, p. 302). This study was able to illustrate how theories of the risk society and moral panics are valuable frameworks in the understanding of the news media on and WBE for Dutch municipalities. WBE as a technological artefact has come with new risks whilst trying to detect and monitor them— analytical insecurities, sensationalized reporting, and data that foremost appeals to conservative and moral values of local stakeholders can lead to increased stigma on municipalities and drug users, and faulty decision-making in policy. When aimed to increase public health the method alone does not suffice; collaboration with other monitoring tools is essential. More research is needed on how to optimize WBE for Dutch municipalities; both from a methodological and policy perspective.

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