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A Scoping Review of Perinatal Recreational Drug Use: Methods, Socio-Demographic Characteristics and Commonly Used Drugs

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Abstract

Perinatal recreational drug use is a leading cause to poor pregnancy out comes, increased maternal, foetal or neonatal morbidity and mortality. This review paper sought to identify socio-demographic determinants of perinatal drug use, commonly used drugs by perinatal mothers and methods used to assess drug use. We retrieved information from ten data bases namely: PubMed, Google Scholar, Scopus, Web of Science, CDC library, WHO library, Wiley Online library, Springer Link Scientific Reports, Bio Med Central and National Library of Medicine. Inclusion criterion was studies that were designed to document perinatal drug use and studies published in English between January 2012 and February 2023. A total of 27 studies were reviewed distributed as follows: America (6), Europe (4), Australia (1), New Zealand (1), Asia (1), South Africa (3), West Africa (2) and East Africa (10). Out of all the 28 studies, 24 were based on self-reported history, 4 were anchored on blood, hair, urine and meconium toxicology while 3 used both self-reported history plus confirmed drug use approach. Key socio-demographic characteristics that predicted perinatal drug use were low income, unemployment, low level of education, single parenthood, multiple sexual partnerships, having a partner or friend who uses drugs, having experienced intimate partner violence and pre-pregnancy drug use. On the other hand, maternal stress, depression, anxiety, loneliness and history of mental illness influenced drug use in this sub-population. Alcohol was the most commonly used drug globally. Others were *Cannabis*, tobacco products, methamphetamine, cocaine, amphetamine/*khat* and heroin. We recommend screening of drug use during the perinatal period using more than one method, routine assessment of mental distress and provision of targeted counseling to perinatal mothers in distress. Further, we recommend enhanced targeted health education on risks associated with drug use during perinatal period and more research on perinatal recreational drug use.

Key words: Peri-natal; Socio-demographics; Self-reported; Confirmed; Drug use

Introduction

Perinatal recreational drug use is a critical global public health problem that threatens maternal health and child survival (Marroun et al., 2018; Shukla et al., 2023). During pregnancy the placenta is the functional unit for the survival of the foetus. Majority of the recreational drugs used cross placental barrier exposing the foetus to the same effects experienced by the mother (Powers et al., 2013; Ross et al., 2015). Most recreational drugs used during pregnancy cross placental barrier into the foetal circulation. They disrupt the neural tube and associated connections during embryology period (Yazdy et al., 2013) leading to poor pregnancy outcomes (Ryan et al., 2018; Bitew et al., 2020). Additionally, drugs increase the likelihood of lifelong cognitive, behavioural and neurodevelopmental disabilities on the child (Alvik et al., 2013; Kurita et al., 2020; Lees et al., 2020).

Drugs such as marijuana and cocaine have vasoconstrictive properties that can diminish blood, oxygen and nutrients supply to the foetus. These drug effects heighten the risk of abortions, premature births, low birth weight babies, developmental delays, behavioral and learning problems (Conner et al., 2019; Dejong et al., 2019). Although harmful effects of drug use during

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pregnancy are relatively documented, effects during lactation have been far less examined.

Recreational drug use while lactating is equally risky to the baby since most of these drugs are eliminated through the breast milk (Davis et al., 2020; Anadón et al., 2022). Furthermore, use of drugs disrupts the intake of nutrients and interfers with the optimal environment required for foetal development (Sebastiani et al., 2018). This fact increases the likelihood of low birth weight infants (Crume et al., 2018; Gauthier et al., 2018). In the same way, breast feeding process is affected by drug use due to hormonal imbalance (Napierala et al., 2016).

In Kenya, the coastal region has had a longer documented history of drug use with Mombasa County having one of the highest populations of drug users (NASCOP, 2013; NASCOP, 2019). For example, by 2006 heroin was reported to have been available in the streets of Mombasa for more than 25 years (Beckerleg et al., 2006). Mombasa being a cosmopolitan city and a tourist destination it creates an opportune environment for both drug use as well as sex work. Its proximity to neighbouring countries with porous borders makes it a convenient route for drugs on transit (Kamenderi et al., 2012; NACADA, 2017).

Even though data and information on drug use in Kenya as well as the larger Africa is relatively well documented, consolidated literature on peri-natal drug use is wanting, yet this is an area of great concerns. It is for this reason we sought to carry out a scoping review of the literature on perinatal drug use to answer the following questions: which methods are used in reporting perinatal drug use?; what socio-demographic characterics predict perinatal drug use?; and what are the commonly used drugs during perinatal period?.

Methodology

Overall ten databases were searched between December 2022 and February 2023. These data bases were: PubMed, Google Scholar, Scopus, Web of Science, CDC library, WHO library, Wiley Online library, Springer Link Scientific Reports, Bio Med Central and National Library of Medicine. Inclusion criterion was studies that were designed to document perinatal drug use; and studies published between January 2012 and February 2023 in English. We excluded reviews, case series, studies published before January 2012 and studies published in other languages but not translated to English. Our key search terms were: drug use in pregnancy; drug use among breastfeeding mothers; peri-natal drug use; alcohol use in pregnancy; and foetal alcohol spectrum disorders. Descriptive statistics based on themes was used to explain the data.

Results

A total of 27 studies met the criterion described in materials and methods. These studies had been carried out in the following countries: USA (n = 3); Canada (n = 2); Mexico (n = 1); Spain (n = 2); Norway (n = 1); France (n = 1); Australia (n = 1); New Zealand (n = 1); Nepal (n = 1); South Africa (n = 3); Nigeria (n = 1); Ghana (n = 1); Ethiopia (n = 3); Tanzania (n = 2); Uganda (n = 2); Kenya (n = 2). The key findings of these studies have been summarized in Table 1.

Table 1. Summary of documented peri-natal recreational drug use

Country	Authors / Year	Methods	Socio-demographic determinants	Commonly used drugs
USA	Metz *et al*. (2013) Masho *et al*. (2013), Park *et al*. (2022)	National database-NSDUH Self-reported history	Low socio-economic status, 18-25 years, low household income, unemployment, low education level, unmarried, history of drug or alcohol treatment	Alcohol, Tobacco *Cannabis*
New Zealand	Wouldes *et al*. (2013)	Self-reported history	Low social-economic status, single parenting, delayed antenatal care, polydrug use	Methamphetami-ne
Mexico	Gomez-Ruiz *et al*. (2022)	Hair toxicology	Poly drug use, young age, low education grade	*Cannabis,* Nicotine, Methamphetami-ne, Cocaine

Canada	Currie *et al*. (2021) Brown *et al.* (2019)	Self-reported history	Marriage, high education level, middle and upper economic status Being 25-30 years, maternal depression	*Cannabis,* Opioids Alcohol, Tobacco
Spain	Jarque *et al*. (2021), Pereira *et al.* (2022)	Meconium, urine, self-reported interview	Being <24 years old, lack of antenatal care, being a single mother, a previous smoker, depression	Tobacco
Norway	Gabrhelík *et al.* (2021)		No significant socio-economic determinant	*Cannabis*
France	Melchior *et al.* (2015)	National database-ELFE	Unfavorable socio-economic status, single parenting, poly-drug use	Tobacco Alcohol
Australia	McCormack *et al*. (2017)	Interview schedule	Low socio-economic status	Alcohol
Nepal	Singh *et al*. (2017)	Self-reported history	Stress, being 20-34 years old, low education status	Tobacco
South Africa	Modjadji & Pitso,(2021), Mahnke *et al.* (2021), May *et al*. (2022)	Self-reported history, blood toxicology, interviews	Unemployed, low social economic status, older age, low education level, late recognition of pregnancy, high gravidity and high parity	Alcohol, Tobacco
Nigeria	Envuladu *et al*. (2013)	Self-reported history	Unemployment, low education level, being married	Alcohol
Ghana	Da Pilma Lekettey *et al.* (2017)	Self-reported history	Being current drug user, to socialize, low socio-economic status, influenced by friends	Alcohol
Ethiopia	Addis *et al*. (2020) Wubetu *et al*. (2019) Anteab *et al.* (2014)	EDHS-National database, self-reported history	Unemployment, attempted abortion, having >2 sexual partners, *khat* use, poor social support, depression/anxiety, family history of mental illness, being married, partner using alcohol, peer pressure	Alcohol
Tanzania	Isaksen *et al*. (2015) Mpelo *et al.* (2018)	National database (KCMC), self-reported history	Religion, older age, high pre-pregnancy body mass index, low education status, making local brew, no history of obstetrical complications	Alcohol
Uganda	Agiresaasi *et al*. (2021) Wynn *et al.* (2021)	Self-reported history	Being above 35 years, low level of education, pre-pregnancy alcohol use, having >2sexual partners, limited knowledge on perinatal alcohol use, married, Catholic faith, working in a bar, partner using alcohol, history of intimate partner violence	Alcohol
Kenya	Yoteibieng *et al.* (2016) Mburu *et al*., (2020)	Self-reported history	Stress, loneliness, violence, rape, poverty, child care responsibility, partner using drugs	Alcohol, Heroin, *Cannabis,* Rohypnol, *Khat*, Cocaine

Discussion

In the United States of America (USA), based on a National Survey on Drug Use and Health (NSDUH) that partly assessed drug use among non-institutionalized individuals living in households within the 50 states, results showed that drug use among pregnant women was associated with low socio-economic status (Oh et al., 2017). These findings were based on self-

reported drug use history done via computer-assisted interview. Further analysis reported being young (aged 18–25), white (67.6%), having a household annual income of < $ 20,000, unmarried (66.2%) with high school or less education (72.2%) predicted the risk of drug use. Moreover 21.2% of participants had a history of drug or alcohol treatment; 21.7% reported past-month alcohol use; 45.5% were current cigarette smokers; and 25.9% were current marijuana users (Oh et al., 2017; Metz et al., 2018).

Similarly, a hospital based study was done in Virginia State (USA) among pregnant mothers. Based on self-reported history the study reported alcohol and illicit drug had significant associated with smoking during pregnancy. Majority of the mothers using illicit drugs had an average age of 25 years, were unemployed and had low education level (Masho et al., 2013).

Still in the USA, a different study examined whether nativity (USA born *versus* foreign-born) and stress levels during pregnancy were associated with antenatal drug use as well as post-natal common mental disorders (CMDs). Information on nativity and stress during pregnancy were based on self-reported history. The study reported USA born women had elevated stress (28.8%) compared to foreign born mothers (13.0%; $p < 0.001$). In addition, drug use was significantly higher among USA born mothers who were young ($p < 0.001$), unmarried (83.6%; $p < 0.001$), less educated ($p < 0.001$) and had low-income ($p < 0.008$) compared with their foreign-born counterparts. The study concluded that nativity plus stress increased the risk of antenatal drug use and post-natal CMDs among USA born women (Park et al., 2022).

A comparative prospective study carried out in the USA and New Zealand on methamphetamine (MA) use during pregnancy, co-morbidity of substance use disorder (SUD) and psychiatric disorders at 1-month postpartum had congruent findings. In both countries those in the MA groups had lower socio-economic status, increased single parenting, increased poly-drug use and delayed antenatal care (Woulde et al., 2013).

Closer to the USA in Mexico, drug use in a cohort of 300 pregnant women was assessed using mass spectrometry of the maternal hair. Out of 300 examined hair samples, 35.4% tested positive for *Cannabis*, nicotine (27.7%); methamphetamine (18.9%); cocaine (10.2%) among others and 35 (16.3%) for poly-drug use. Tobacco use was significantly associated with younger age and low education level ($p < 0.05$) (Gómez-Ruiz et al., 2022).

In Calgary, Canada a secondary analysis on data from a cohort of 1,660 pregnant women reported drug use. Drug use in this sub-population was associated with being married, well-educated, middle and upper middle status (Currie *et al*., 2021). These findings were divergent from most studies that report drug use to be associated with low socio-economic status. Still in Canada, data obtained prospectively from perinatal and neonatal databases in a tertiary hospital in London -Ontario, described drug use in this sub-population and mean maternal age of 29.4 ± 5.4 years was inversely associated with alcohol and *Cannabis* use (Brown et al., 2019). The study identified maternal depression as the primary risk factor for alcohol consumption during pregnancy (Brown et al., 2019).

In Norway, a prospective study based on data from a Mother and Child Cohort Study (MoBa) reported 97.3% of women had used *Cannabis* before pregnancy while 2.6% used *Cannabis* during pregnancy. Among those who reported *Cannabis* use during pregnancy, 23.2% had used *Cannabis* during the second and third trimester. Even though the study indicated there was no significant association of *Cannabis* use with socio-demographics, the association between *Cannabis* use in pregnancy and reduced birth weight was significant (Gabrhelík et al., 2021).

In Spain, tobacco consumption was linked to depression and anxiety symptoms among perinatal mothers. The study assessed quantity of tobacco use from 1st trimester of pregnancy to 7 months after giving birth based on self-reported drug use history and urine toxicology. The study showed that 28.3% of the participants had smoked before confirmed pregnancy. Smoking more cigarettes weekly before pregnancy was associated with being a smoker at the 1st trimester of pregnancy as well ($p < 0.001$). Similarly at the 1st trimester, more depression symptoms were significantly associated

(p = 0.028) with being a smoker (Pereira *et al*., 2022). In a different prospective hospital based study in Spain, data was obtained by interview questionnaires and biomarkers of foetal exposure to tobacco measured using meconium samples. The study reported maternal age of less than 24 years, lack of pregnancy care, single-mother families and active tobacco smoking as the risk factors associated with prenatal exposure to tobacco products (Jarque et al., 2021).

Data obtained from a nationally representative sample of children born in France (ELFE, 2011 study) was used to assess maternal drug use in pregnancy. Analysis showed that unfavorable socio-economic status was connected to tobacco smoking among native-born women while single parenthood was associated with alcohol use among the migrant women (Melchior et al., 2015). Furthermore, poly-drug use and psychological difficulties had strong association with tobacco use, alcohol or binge drinking among the migrant women than native-born women (Melchior et al., 2015).

In Australia, pregnant women were prospectively recruited from general antenatal clinics of four public hospitals in Australia's metropolitan areas using detailed interviews on alcohol use before and after recognition of pregnancy. Although the study reported that most of the women drank alcohol between conception and pregnancy recognition, 18.3% reduced after being aware of the pregnancy. Low socio-economic status (SES) was the strongest predictor of alcohol use (McCormack et al., 2017).

In southern Terai region of Nepal (South Asia) a community-based cross-sectional study carried out in 52 wards within Dhanusha district recorded use of smokeless tobacco products based on participant's self-reported history. In this particular study, one in five participants consumed tobacco with 13.4% of the participants reporting use of smokeless tobacco. Factors significantly associated with smokeless tobacco use were alcohol use, stress, being non-vegetarian and not-exposed to mass media. Additionally, mothers within the age group of 20 to 34 years and those with primary education or less were more likely to use smokeless tobacco (Singh et al., 2017).

Several studies in South Africa have documented perinatal drug use. Prevalence of foetal alcohol syndrome (FAS) was ascertained in the Northern Cape Province. The study by Urban et al. (2015) enrolled grade one learners who were screened for dysmorphic features of FAS and reported that 94.7% of the eligible learners had FAS (). In Gauteng province a study by Modjadji and Pitso (2021), reported that 18.7% of the mothers had used tobacco and 3% had consumed alcohol during pregnancy. Furthermore, nearly three-quarters (67.3%) of lactating mothers reported current tobacco and alcohol use with a vast majority (63%) being unemployed and 41.3% living in households with a monthly income of less than $ 64.97 (Modjadji & Pitso, 2021). These findings were anchored on self-reported history.

In a study done in Cape Town, infant plasma extracellular circulating micro ribonucleic acid (exmiRNAs) was used to identify biomarkers of prenatal alcohol exposure (PAE). The study analyzed blood samples from a heavily alcohol exposed cohort to determine whether these biomarkers of PAE can be used to predict PAE-related growth restriction and cognitive impairment. The study reported infant exmiRNAs can assist to identify infants who will exhibit PAE-related deficits in growth and cognition. Alcohol use in most of the mothers to these infants was associated with low level of education and being economically disadvantaged (Mahnke et al., 2021).

In the Western Cape Province of South Africa, a cross-sectional study was conducted by May et al. (2022) to assess physical and neurobehavioral traits of foetal alcohol spectrum disorders (FASD) and its prevalence. The study used active case ascertainment methods among a school-based cohort and maternal risk factor interviews. Results showed that 31% of the children had FASD, the prevalence of FAS was 104.5 per 1000, partial foetal alcohol syndrome (PFAS) was 77.7 per 1000 and alcohol-related neurodevelopmental disorder (ARND) was 125.2 per 1000 children. Mothers to these children reported alcohol use during the 1st and 2nd trimesters or throughout pregnancy. Associated risk factors for alcohol use were less formal education, late recognition of pregnancy and

higher gravidity, parity and older age during the index pregnancy (May et al., 2022).

In West Africa, drug use among pregnant mothers was documented in Jos Plateau State in Nigeria. This was a hospital based study which participants self-reported current drug use. Notably, 5.4% of pregnant mothers self-reported being current alcohol consumers, 3.9% were self-medicating with sedatives and 1.5% were active cigarette smokers. In that study, perinatal drug use was significantly associated with unemployment, low education and being married (Envuladu et al., 2013). In Accra - Ghana, a study reported the prevalence of alcohol use by pregnant women was 54% out of whom 73% reported to have ever used an alcoholic drink before pregnancy. Among those who reported to have ever used, 77% used alcohol "once a while" and 48% were current alcohol users. More than half of current users (53%) pregnant women used alcohol in the company of friends particularly to socialize (39%) whereas (63%) of the women reported monthly average income of less than GHS 200 (Da Pilma Lekettey et al., 2017). These findings were anchored on self-reported history of perinatal alcohol use.

In Ethiopia, a cross-sectional study utilized national data from a 2011 to 2016 survey (EDHS, 2011-2016). The prevalence of alcohol use among pregnant women was 30.2%. Unemployment, ever attempted termination of pregnancy, having more than two sexual partners in a lifetime and khat chewing increased the risk of alcohol use during pregnancy in this sub-population (Addis et al., 2020). Still in Ethiopia, a cross-sectional study was conducted in Debre Berhan town among pregnant mothers who self-reported current alcohol use during their current pregnancy. The study reported having poor social support, moderate to severe depression or anxiety, diagnosed family history of mental illness and a history of abortion as factors associated with alcohol use in pregnancy (Wubetu et al., 2019). In Northwest Ethiopia, a study based on self-reported history of drug use showed that being married, having alcohol using partner, encouragement to take alcohol by someone else, unemployment and unplanned pregnancy had significant association with maternal alcohol consumption (Anteab *et al*., 2014).

In Moshi, Tanzania a study retrieved data related to 34,090 births between 2000 and 2010 obtained from the Medical Birth Registry at Kilimanjaro Christian Medical Centre (Medical Birth Registry KCMC, 2000-2010). Religion was identified as a strong factor associated with alcohol use as Christians were at higher risk (79.5%) of consuming alcohol more than the Muslims (14.8%). Other factors associated with alcohol use were; being older and having a higher pre-pregnancy BMI (Isaksen et al., 2015). In Dodoma region of Tanzania, a study based on self-reported history recorded a prevalence rate of 15.1% with pre-conceptual alcohol use (Mpelo et al., 2018). Having relatives who use alcohol, low education status, making local brews for income and reporting no previous obstetrical complications showed significant association with alcohol use (Mpelo et al., 2018).

In Northern Uganda, a cross-sectional study that anchored on self-reported current alcohol use reported 23.6% of the pregnant mothers as current alcohol consumers. In this cohort, maternal alcohol use was associated with being above 35 years old, low level of education, pre-pregnancy alcohol use, having two or more sexual partners and limited knowledge on alcohol use during pregnancy (Agiresaasi et al., 2021). In the southwest region of Uganda among the Rakai Community, 33% of the pregnant mothers reported being current alcohol users. Socio-demographic factors found to be significantly associated with perinatal alcohol consumption were being married, having attained primary or lower education level, being a Catholic compared to other Christians denominations; working in a bar or restaurant as compared to agricultural work; having more than one sexual partner in the past year, having a partner who uses alcohol and history of intimate partner violence in the past year (Wynn et al., 2021).

In Kenya, perinatal drug use is scantly documented. However, in Kisumu City 16 out of 17 participants in a qualitative study self-reported using alcohol and injecting heroin during pregnancy. Stress, loneliness, violence,

rape, extreme poverty and majorly child care responsibility were the contributing factors to drug use (Yotebieng et al., 2016). Along the coastal region of Kenya, participants in a qualitative study in Mombasa City and Kilifi town self-reported perinatal drug use. A vast majority (85%) of women injected heroin, out of whom 27% used heroin alone and 58% used heroin in combination with *Cannabis*, rohypnol, *khat*, solvents, alcohol or cocaine. Drug use in this sub-population was linked to stress and having a drug using partner (Mburu et al., 2020).

Conclusion

In this paper among the 27 studies reviewed, 4 studies had retrieved information from national data bases. A total of 24 of the studies based results on self-reported drug use history while 4 of the studies were based on confirmed blood, hair, urine, and meconium toxicology. Among the 27 studies, 3 studies used both self-reported and confirmed drug use approach. Key socio-demographic characteristics that predicted perinatal drug use were low education level, young age (below 30 years), being single, unemployment and having a history of drug use. On the other hand, maternal stress, depression and anxiety influenced drug use in this subpopulation. This study recommends screening of drug use using more than one method, assessment of mental distress and provision of targeted counseling to perinatal mothers in distress. Further on, we recommend enhanced targeted health education on risks associated with drug use during perinatal period and more research on perinatal recreational drug use.

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