NATIONAL AIA RESOURCE CENTER

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FACTSHEET

Prenatal Substance Exposure

In the United States, a risk factor for poor behavioral and developmental outcomes among children is prenatal exposure to substance use (Coles & Black, 2006). Public concern for children in general has made prenatal exposure a fundamental topic for research. Outcome studies of drug use among pregnant women continue to grow as an awareness of the consequences increase and drug epidemics spread (Coles & Black, 2006). Existent studies have found that a number of factors contribute to substance use among pregnant women including environmental and familial triggers, which consequently have an effect on the development of a child (National Abandoned Infants Assistance [AIA] Resource Center, 2006). What follows is a discussion about the contributing factors of substance use among pregnant women, its consequences, and possible paths to address the problem.

PREVALENCE OF SUBSTANCE USE AMONG PREGNANT WOMEN

The 2010 National Survey on Drug Use and Health (NSDUH) found that pregnant women between 15 and 44 years of age have a lower prevalence of illicit drug, alcohol, and tobacco use than non-pregnant women of the same age (Substance Abuse and Mental Health Services Administration [SAMHSA], 2011a). The survey found that of pregnant women, 4.4% used illicit drugs in a given month, 10.8% reported current alcohol use, and nearly 16.3% reported past month tobacco use. These rates of substance use were significantly lower than the rates for non-pregnant women in the same age group where 10.9% used illicit drugs, 54.7% used alcohol, and 26.7% reported tobacco use (SAMHSA, 2011a). Although overall rates of substance use are lower among pregnant women compared to non-pregnant women, the rate of illicit drug use for pregnant women aged 15 to 17 (16%) did not significantly differ from the rate for non-pregnant women in this age range (13%) (SAMHSA, 2011a). The survey also showed that substance use tends to decrease considerably between the 1st and 3rd trimesters, but it increases again following child birth.

It is difficult to precisely gauge the prevalence of substance use among pregnant women due to various methodological limitations, including underreporting by women, inconsistent use of screening or drug testing among providers, and inaccurate reporting systems. Many professionals in the field believe that these national data underestimate the total number of infants and families affected by prenatal substance use. In fact, studies of prenatal screening suggest that as many as one-fifth of infants born in the United States each year are prenatally exposed to alcohol, tobacco or other drugs, and 75-90% of them go undetected (Carpenter, 2010).

SOCIAL AND PSYCHOLOGICAL ISSUES

Available research suggests that female substance users have socioeconomic, emotional, and psychological disadvantages when compared to non-using women, which in turn can affect children's growth and development (Flavin, 2002; McKeganey, Barnard, & McIntosh, 2002). Risk factors associated with perinatal substance use include domestic violence, a history of sexual or physical abuse, poverty, unemployment, and mental illness.

Substance abuse significantly affects people living in poverty and women have long been overrepresented in this population. About 3.7 million persons in poverty (7.5%) were classified as being in need of substance abuse treatment, but only 17% of these people get treatment. Many of them do not receive treatment because they lack health insurance. Nearly 27% of people in households with incomes less than $25,000 do not have health insurance coverage (SAMHSA, 2010). Uninsured rates drop greatly with each subsequent income bracket; only 8% of people in households with incomes of $75,000 or more lack insurance (DeNavas-Walt, Proctor, & Smith, 2011). Even if low-income persons receive treatment, they are less likely to successfully complete it than other patients (SAMHSA, 2011b). They are also more likely to have a co-occurring psychiatric disorder complicating treatment. Poverty, therefore, may be a barrier to recovery for many women abusing substances.

In addition to financial difficulties, mental illness is common among female substance abusers. Lifetime affective disorders (e.g., major depression) were found to be the most common psychiatric diagnoses among pregnant substance abusers in drug treatment (Kissin, Svikis, Morgan, & Huang, 2001). Social phobia and other anxiety disorders also commonly afflict substance using women.

Numerous studies have also shown past and/or current incidences of physical, sexual, and emotional abuse to be common in the lives of female substance users. Lansford and colleagues (2010) found that physical abuse in early childhood predicts substance use in adolescent and adult females. One recent study confirmed that childhood abuse, especially sexual abuse, is linked to heavy drinking, alcohol dependence and serious alcohol-related consequences (Lown, Nayak, Korcha, & Greenfield, 2011).

In addition to childhood abuse, domestic violence tends to be linked to substance abuse among pregnant women (Datner, Wiebe, Brensinger, & Nelson, 2007). Separate studies have found that 40-60% of married or cohabiting partners in treatment for substance abuse reported episodes of recent domestic violence (Fals-Stewart & Kennedy, 2005). Furthermore, Kissin et al. (2001) reported that almost half of substance abusing women in treatment report histories of emotional abuse.

The current literature suggests that the social and psychological problems common to female substance abusers also impact their children's development. For example, maternal substance use is associated with insensitivity when interacting with children, difficulty monitoring older children, and child maltreatment, which can all negatively affect child development (Hans, 2002). Moreover, mental illness and addiction may make it difficult for substance using parents to form healthy attachments with their newborns and provide adequate parenting (Barnard & McKeganey, 2004). Attachment problems may be signaled by emotional withdrawal of the child, as well as maternal-child relational difficulties, such as lack of responsiveness or engagement between the dyad (Child Health and Development Institute of Connecticut, 2006; O'Connor, Kogan, & Findlay, 2006).

Ackerman et al. (2010), however, maintain that the home environment after birth has a greater effect on growth and development than in-utero exposure to drugs. For example, one study found that children from disadvantaged backgrounds without in-utero drug exposure perform as poorly on developmental measures as children from similar backgrounds with prenatal drug exposure (Asanbe & Lockert, 2006; Behnke et al., 2006). These results suggest that the physical and social environments of children affected by substance abuse may have a more significant impact on development than maternal drug use alone.

BIOLOGICAL AND DEVELOPMENTAL EFFECTS OF IN-UTERO DRUG EXPOSURE ON CHILDREN

Although once thought to have uniformly detrimental effects on the development of the fetus, the short- and long-term effects of prenatal drug exposure on children are no longer clear. First, many women who use drugs prenatally are polydrug users, making it difficult to isolate the effects of any one drug (Lester, Tronick, Gasse, & Seifer, 2002). Additionally, the amount of exposure, frequency of use, and timing of use during pregnancy may influence the impact of exposure on child outcomes (Carta et al., 2001; Covington, Nordstrom-Klee, Ager, Sokol, & Delaney-Black, 2002; Singer et al., 2004).

Determining the effects of prenatal substance use is also difficult because the biological effects of the substance are often combined with home and environmental deficiencies and poor utilization of prenatal care (National Institute on Drug Abuse, 2009). In addition to the environmental challenges already mentioned, children of substance users also are more likely to be in out-of-home placements, further complicating outcome findings (Barnard & McKeganey, 2004).

Despite the inherent difficulties in establishing the direct effects of prenatal drug exposure, researchers have identified unique sets of outcomes for children prenatally exposed to certain drugs. It should be noted that children can also suffer ill effects if the mother uses any of these drugs while breast-feeding (Friguls et al., 2010). Keeping in mind that all studies are subject to limitations, the following section describes some of the effects of the drugs most commonly used by pregnant women.

Tobacco

It is almost universally recognized that tobacco has detrimental effects on the fetus. Tobacco is the most commonly used drug during pregnancy and is associated with adverse birth outcomes, including miscarriage, placental abruption, placental insufficiency, and low birth weight (Covington et al., 2002; Shankaran et al., 2004; Wright & Walker, 2001). Additionally, babies of women who used tobacco while pregnant have reduced length, cranial, and thoracic measurements at birth (Wright & Walker, 2001). Research further suggests that children exposed to tobacco in-utero suffer more respiratory infections and asthma (Gupta, 2001). Respiratory control is so compromised in tobacco-exposed infants that they are two to five times more likely to experience sudden infant death syndrome (SIDS) than non-exposed infants (Sawani, Olsen, & Simakajorboon, 2010). Those who survive infancy may later experience language delays (B. A. Lewis et al., 2007) or coordination and physical control problems (Larsson & Montgomery, 2010).

Alcohol

Alcohol consumption during pregnancy is one of the leading causes of preventable birth defects and developmental problems including language and motor delays and poor academic achievement (Cone-Wesson, 2005; Goldschmidt, Richardson, Stoffer, Geva, & Day, 2006; Kalberg et al., 2006; McGee, Bjorkquist, Riley, & Mattson, 2009). There is a long-standing debate over the amount of alcohol that is safe to drink during pregnancy. Some have argued that light drinking during pregnancy does not negatively affect the fetus (Kelly et al., 2010). On the other hand, other research continues to find cognitive and socioemotional deficits among children exposed to even small amounts of alcohol (Swedish National Institute of Public Health, 2009). Alcohol exposure also adversely impacts infant growth (Day, Richardson, Geva, & Robles, 2006; Shankaran et al., 2004). However, the effects of alcohol exposure are not limited to infancy and childhood; prenatal exposure to alcohol, particularly in early pregnancy, has also been found to increase the likelihood of developing an alcohol disorder in adulthood (Alati et al., 2006). Given these consequences, nearly all leading health organizations, including the American Society of Addiction Medicine (ASAM), the CDC, SAMHSA, the National Organization on Fetal Alcohol Syndrome, the Office of the Surgeon General, and the American College of Obstetrics and Gynecology agree that there is no safe time or safe amount of alcohol to use in pregnancy, and recommend total abstinence for the duration of the pregnancy (ASAM, 2011).

Fetal Alcohol Spectrum Disorders (or FASD) encompass the range of effects that may result from prenatal exposure to alcohol (CDC, 2011a). The CDC (2011b) estimates a Fetal Alcohol Syndrome prevalence rate of between 0.5 to 2.0 cases per 1,000 live births. While not a clinical diagnosis, FASDs include physical, mental, behavioral and/or learning disabilities (CDC, 2011a). More specifically, problems associated with FASD may include abnormal facial features; poor coordination; poor reasoning and judgment; hyperactive behavior; learning disabilities; intellectual disability or low IQ; and problems with heart, kidney, or bones (Burden et al., 2011; CDC, 2011a). Alcohol exposure may impact school performance, especially in mathematics, and it appears to affect academic achievement even after controlling for IQ (Goldschmidt et al., 2006; Goldschmidt, Richardson, Cornelius, & Day, 2004; Howell, Lynch, Platzman, Smith, & Coles, 2006). Prenatal alcohol exposure is highly associated with insecure attachments between infants and mothers (O'Connor et al., 2006). On the other hand, O'Connor and colleagues (2006) found that alcohol-exposed children who had emotionally supportive mothers coped better with frustration and had higher levels of attachment security than both alcohol-exposed and unexposed children with unsupportive mothers. This again points to the role of the home environment in determining the effects of substance exposure on child outcomes.

Marijuana

Relative to other drugs, less research has been published on the impact of prenatal exposure to marijuana, and some of the findings are inconsistent. However, one of the most prevalent findings is the impact of prenatal marijuana exposure on the child's executive functioning, and impacts their attention, flexible problem solving, and working memory abilities (Fried & Smith, 2001; Goldschmidt, Day, & Richardson, 2000). Prenatal exposure to marijuana has also been linked to subtle increases in hyperactivity, impulsivity, inattention, externalizing problems (e.g., aggression and delinquency), and memory deficits (Goldschmidt et al., 2000). Furthermore, a recent study found that prenatal marijuana use impairs a baby's growth and development with greater impairment the longer a woman uses marijuana during pregnancy (Gray et al., 2010). This study also found that, like alcohol, marijuana may

interfere with intellectual development and academic achievement. Prenatal exposure to marijuana has also been associated with increased levels of depression during childhood (Gray, Day, Leech, & Richardson, 2005), as well as earlier initiation and higher levels of marijuana use at age 14 (Day, Goldschmidt, & Thomas, 2006) compared to unexposed controls.

Cocaine

Due to the high prevalence of crack cocaine use among pregnant women during the 1980s and 90s, many studies about its effects on infant development emerged. Some research has concluded that prenatal exposure to cocaine can have detrimental effects on child health and development, particularly in terms of attention, self-regulation and language.

One study found that cocaine-exposed infants had twice the developmental delay during the first two years of life compared to non-exposed infants (Singer et al., 2002). Other research has linked cocaine exposure to poor motor development at ages one to three (Lewis, Misra, Johnson, & Rosen, 2004) and motor skills deficits at age seven (Arendt et al., 2004). Similarly, growth may be restricted in infants exposed to cocaine (Shankaran et al., 2004), in part because they exhibit feeding problems. Specifically, these infants often don't wake to feed and eat only small amounts at a time (Drennen, 2010). These problems put the infant at risk for dehydration or malnutrition, which affect both physical growth and brain development. On the other hand, prenatal cocaine exposure may actually be associated with *elevated* body weight and blood pressure in older children (Shankaran et al., 2010).

On the other hand, studies controlling for socioeconomic status, preschool and school-age children, with or without prenatal cocaine exposure, have been found to perform similarly on tests of cognition and child development (Asanbe & Lockert, 2006; Behnke et al., 2006). These results suggest that the physical and social environments of children may have a more significant impact on development than the maternal cocaine use alone.

Methamphetamine

The rates of methamphetamine use among pregnant women doubled between 1997 and 2007 (SAMHSA, 2007). Despite the growth of this problem, a limited number of studies focus on prenatal exposure to meth. One study linked methamphetamine use during pregnancy to an increased likelihood of premature delivery, lower birth weights, and placental abruption (Smith et al., 2003). In addition, infants exposed to meth often have the same feeding problems seen in those exposed to cocaine (Drennen, 2010). Furthermore, children prenatally exposed to methamphetamines show lower scores than non-exposed children on motor-integration tests (Chang et al., 2009).

However, because the vast majority (i.e., approximately 80%) of women who use meth also use alcohol and/or nicotine, it is difficult to determine the specific effects of the methamphetamine (Arria et al., 2006). A recent exploratory study attempted to isolate the effects of meth by comparing the outcomes of babies exposed to both methamphetamine and alcohol, those exposed to only one of these substances, and those exposed to no substances (Sowell et al., 2010). The findings indicate that both alcohol and methamphetamine impair the part of the brain responsible for attention and verbal memory and learning, but that meth has a negative impact even beyond that of alcohol alone.

Heroin

Heroin is an opiate that should be studied in conjunction with methadone, the drug used for the treatment of heroin addicted individuals (CDC, 2002). Infants born addicted to heroin, methadone, or any other opioid (e.g., oxycodone) typically present characteristics of neonatal opiate abstinence syndrome, or NOAS (Messinger et al., 2004). NOAS is associated with premature birth, lower birth weight, slightly depressed motor performance and a tendency toward behavioral difficulties (Messinger et al., 2004). Symptoms of NOAS appear within 24 to 72 hours after birth and characteristically include a high-pitched cry, tremors, and stiff limbs (Drennen, 2010). Over time, the infant may begin sweating, breathing rapidly, and experiencing gastrointestinal problems. It is important to note that stimulant drugs can mask opiate withdrawal symptoms. Consequently, an infant born addicted to an opiate but also exposed to a stimulant, like methamphetamine or cocaine, may not show symptoms of NOAS.

Prescription Drugs

Some pregnant women may use psychotherapeutics, including prescription pain relievers, tranquilizers, stimulants, or sedatives, for non-medical purposes. Next to marijuana, prescription pain relievers, such as OxyContin®, are the second most commonly abused illicit drug. Although few studies have examined the impact of prescription drug abuse on fetal development, the pregnancies of women using opioid pain relievers are often associated with a host of medical problems including an elevated risk for obstetric complications, such as premature birth, stroke, and drug withdrawal (Bennett, 1999; Reynolds, Riel-Romero, & Bada, 2007).

SOCIETAL IMPACT OF PRENATAL SUBSTANCE EXPOSURE

In addition to its effects on substance users and their families, prenatal substance exposure is associated with significant societal and financial costs. The total lifetime costs of caring for a substance-exposed child have been estimated to be between $750,000 and $1.4 million (Kalotra, 2002). Because substance exposed newborns often have prolonged stays in neonatal intensive care units, their treatment costs total between $71 million and $113 million per year (Jones et al., 2010). The cost of care depends on the drugs to which the newborn was exposed. Treatment for opiate exposure is particularly costly. For example, one study found that newborns whose mothers had been treated with methadone had hospital stays that were on average 7 days longer than those whose mothers received buprenorphine (Czerkes, Blackstone, & Pulvino, 2010). Unfortunately, many women who give birth to substance exposed newborns lack insurance, so the costs must be absorbed by the hospital. If the woman is covered by Medicaid, payment becomes the responsibility of the state and federal government.

Beyond the hospital costs associated with prenatal drug exposure, expensive ongoing interventions are often needed for many exposed children to address developmental, behavioral, academic, and socio-emotional challenges. The costs of care for drug-exposed children have not been evaluated for all drugs, but the CDC (2011b) estimates that the lifetime cost for an individual with Fetal Alcohol Syndrome is $2 million; this condition alone costs the United States an estimated $4 billion annually (Lupton, Burd, & Harwood, 2004).

In addition to being a financial concern, prenatal substance use is often associated with child neglect, displacement, and family dissolution which typically lead to involvement in the child welfare system. One study of foster care children found that prenatal drug use among the biological mothers of the children was more than 22% higher than the national average (Smith, Johnson, Pears, Fisher, & DeGarmo, 2007). Combined prenatal maternal alcohol and drug use also predicted a higher number of foster care placement transitions. Similarly, Ryan and colleagues (2006) found that families affected by substance use have poorer child welfare outcomes than those not affected by substances. Consequently, the need for foster care services is likely to increase for children prenatally exposed to substances, thereby burdening the social service system with additional court hearings, case management demands, costs associated with out-of-home residential placement, and the need for child welfare services (Semidei, Radel, & Nolan, 2001).

INTERVENTIONS FOR PREGNANT AND PARENTING SUBSTANCE USERS

The Substance Abuse and Mental Health Services Administration (SAMHSA) identifies five key programmatic considerations when working with families affected by perinatal substance abuse:

1. Cultural and racial concerns must be considered in every aspect of the treatment process.
2. Treatment should be family-centered and include fathers to the fullest extent feasible.
3. Community coordination and collaboration can help bridge gaps in available resources.
4. Interdisciplinary training is essential.
5. Problems of drug-exposed infants are present in communities throughout the United States and cut across all income levels (Kandall, 1993).

SAMHSA further notes that a comprehensive model for treating substance using women and their newborns should include health, mental health, and social service components, as well as educational, vocational, and employment programs (SAMHSA, 2006). In addition to traditional services (e.g., individual, group, and family counseling; discharge planning and social services; child care; domestic violence services), successful programs also provide social work services in the community and at home; parent education; and obstetric, neonatal, and pediatric medical care (Belcher et al., 2005). Finally, treatment for substance using pregnant and parenting women must be gender-specific, relationship-based, and trauma-informed.

Engaging fathers in treatment and managing parental conflict are key to preventing child maladjustment. Substance-exposed children may be best served by comprehensive programs that involve their entire families—fathers included.

Pre-pregnancy and Prenatal Intervention

Addressing substance use during pregnancy and interconceptually (that is, between a birth and a subsequent pregnancy) should include improving public awareness of the harm substances can do to fetuses. Counseling and drug treatment should be emphasized prior to pregnancy, as substance use in the preconception period predicts substance use during the prenatal period (Floyd et al., 2008). Those who do use substances during pregnancy may benefit from the outreach efforts of family and friends, medical staff, and the media who can inform them about general health issues, as well as the

dangers of prenatal substance use. Recognizing that some women do not access prenatal care for a variety of reasons, aggressive outreach by trained community members may help to engage pregnant substance users and break down barriers to needed services (Flynn, 1999; Watson, Funk, & Twombly, 2010).

Creating a safe and welcoming atmosphere in the prenatal clinic may also be important in providing adequate medical care and retaining the woman in treatment during pregnancy. Even if a woman continues to use, prenatal care can improve the health of the woman and, therefore, the unborn child. In fact, every clinic visit provides an opportunity to screen a woman for substance use. Both the American College of Obstetricians and Gynecologists and the American Medical Association endorse universal screening of all pregnant women for risky drinking and illicit drug use (Nocon, 2010), using tools such as the 4P's PlusC (Chasnoff, Wells, McGourty, & Bailey, 2007), the 5 P'S (Watson, 2010), the T-ACE (Sokol, Martier, & Ager, 1989), and others (Kennedy, Finkelstein, Hutchins, & Mahoney, 2004; Watson, Barnes, Brown, Kennedy, & Finkelstein, 2003). Each of these screens includes a few simple questions about past and present substance use and takes only a few minutes to administer. If presented in a nonjudgmental, empathetic way, these tools can lead to brief interventions that can encourage and educate clients and minimize poor birth outcomes. Unfortunately, research indicates that many OB-GYN doctors do not adequately screen for substance use (Morgan, Cragan, Goldenberg, Rasmussen, & Schulkin, 2010; O'Connor, Nyquist, & McLellan, 2011).

Gender-specific Treatment

Traditionally, substance abuse treatment programming has been geared toward males without regard for the specific needs of women. Yet, increased research on gender differences in substance abuse highlights the importance of gender-specific programs (Greenfield et al., 2007). A recent survey showed that substance abuse treatment facilities with special programs for women generally offer individual, group, and family counseling; discharge planning; social services assistance; child care; domestic violence services; and accommodation for children (SAMHSA, 2006). Many substance using women are in relationships with drug-abusing, and often violent, partners or spouses (Bride, 2001; Kauffman, Silver, & Poulin, 1997; U.S. Department of Health and Human Services, 1991) and they are more likely than men to consider this relationship to be the cause of their drug abuse (Kauffman et al., 1997). Research suggests that the benefits from group therapy are better maintained when women participate in women-only groups compared to mixed-gender groups, perhaps because there are particular issues (e.g., physical or sexual abuse) that many clients feel more comfortable sharing only with other women (Brady & Ashley, 2005; Bride, 2001). Pregnancy-specific treatment programs have also been developed to address concerns specific to this population (e.g., health and nutrition during pregnancy) and provide pregnancy support that more traditional women's programs might not offer. Research indicates that women in pregnancy-specific programs are more likely to complete treatment compared to those in traditional treatment groups (Weisdorf, Parran, Graham, & Snyder, 1999).

Providers who work with substance using women consistently point to stable, nurturing relationships with peer workers, professional case managers, or others as key to supporting women. Building upon this, the recovery coach model is emerging as a promising approach to serving substance using pregnant women (Ryan, Choi, Hong, Hernandez, & Larrison, 2008). A recovery coach is a paraprofessional

who assists parents in obtaining needed benefits, coordinates child welfare and substance abuse treatment staff, and connects the family with treatment providers. Coaches often participate in joint home visits with child welfare workers or substance abuse treatment staff, but are independent from these agencies, ensuring that their focus remains on the family. Evaluations have found that the use of recovery coaches significantly decreases the risk of substance exposure at birth (Brady & Ashley, 2005).

Trauma-informed Treatment

Because many pregnant substance users also have a history of trauma, treatment may be most effective if it is also trauma-informed (Cocozza et al., 2005). Unfortunately, current delivery systems often fail to screen for and address trauma in treatment. Further, they tend to be poorly integrated and focus on the client's immediate safety rather than long-term recovery from the trauma and co-occurring disorders. Recognizing the inadequacy of treatment for women with co-occurring disorders and histories of trauma, SAMHSA identified four core principles to inform best practices with this population:

1) Organizations and services must be integrated.
2) Settings and services must be trauma-informed.
3) Consumers, survivors or recovering persons must be integrated into the design and provision of services.
4) A comprehensive array of services must be made available (Huntington, Moses, & Veysey, 2005).

Implementing these elements may take time, additional staff training and support, and the collaboration of various organizations, but the result will be a service delivery system better equipped to serve women with co-occurring disorders and trauma histories.

Harm Reduction

Harm reduction is gaining acceptance and popularity as a model for treating drug use during pregnancy. An assumption exists in some quarters that women who use drugs while pregnant do not care about the harm they may be causing the fetus. However, Flavin (2002) argues that this is not the case and that many pregnant, drug addicted women practice harm reduction in an attempt to promote the health of their pregnancy. Flavin suggests that instead of a zero tolerance policy surrounding prenatal drug use, policy should reflect the attempts made by pregnant women to limit their drug use, even if they are unable to abstain completely. Flavin introduces a continuum of risk, which labels frequent cocaine use as very risky, but acknowledges that cutting down on use is a positive attempt to ensure a healthy pregnancy. The harm reduction model also recognizes that a woman is able to take positive steps during her pregnancy, such as eating well or receiving prenatal care, even if she is engaging in negative behaviors, such as drug use. Flavin sees the acknowledgement of these healthy behaviors as an important component in substance abuse treatment.

Treatment for Co-occurring Disorders

The fact that mental illness so often co-occurs with substance use disorders in women also necessitates the development of effective programs that treat both disorders. Several models currently exist to address the treatment of co-occurring disorders in pregnant and parenting women

(Price & Simmel, 2002). In the *serial model*, substance abuse is addressed first after which the client moves on to traditional psychotherapy (Drake, Mueser, Brunette, & McHugo, 2004; Horsfall, Clearly, Hunt, & Walter, 2009). However, this model might be ineffective given the high substance abuse relapse rate among addicts and those with severe psychiatric disorders. In the *parallel model*, treatment for psychological problems and addiction are delivered at the same time but in different milieus. This method allows for close collaboration between agencies, but may still not be coordinated enough for clients with acute mental disorders. The third, *integrated model*, is recommended for clients with severe or pervasive psychological illness. This treatment model brings together addiction treatment and psychological therapy for an intensely integrated treatment plan.

Family Treatment Drug Court

Families affected by substance abuse may also benefit from family treatment drug courts (FTDCs) which, unlike standard courts, are tailored to the needs of substance abusing parents (Jaeger, 2010; Yew, 2010). Like adult drug courts, FTDCs include regular court hearings, judicial monitoring, drug testing and treatment, and regular monitoring of performance with predictable rewards and sanctions (NPC Research, 2009; Yew, 2010). However, the primary focus of FTDCs is family reunification, rather than avoidance of jail time, as is the case in adult drug courts.

FTDCs offer services addressing the needs of the entire family, which may include older children, multiple parents, grandparents, and other relatives. Services generally are in the form of case management, drug and alcohol assessment and treatment, education, parenting support, and domestic violence services (NPC Research, 2007; Yew, 2010). FTDCs also form partnerships with medical and social service providers in the community to help connect families to the other services they need. A four-year study of FTDCs found that they are more effective in helping substance abusing women complete treatment and reunify with their children than traditional child welfare case processing; FTDC children also spend less time in out-of-home care than children in traditional courts (NPC Research, 2007).

Residential Substance Abuse Treatment

Residential treatment for women and their children is one method of concurrently addressing the needs of both substance using mothers and their children. These programs have higher retention rates compared to outpatient clinics and long-term positive effects, particularly if they are gender-specific and family-focused (Clark, 2001; Porowski, Burgdorf, & Herrell, 2004). Participants in women-specific residential treatment have also been shown to be more likely to participate in continuing care following discharge (Claus, Orwin, Kissin, Krupski, Campbell, & Stark, 2007). Such programs are often geared toward women-specific issues, promoting the parent-child relationship, and addressing the many other problems associated with chemical dependency (e.g., housing, social, psychological, and employment issues). For example, they can involve teaching hands-on parenting skills to substance users which may bring stability into the lives of their at-risk children, including both the newborn and older children (Porowski et al., 2004). Furthermore, residential treatment programs for pregnant women have been shown to lead to better birth outcomes in terms of infant mortality, premature delivery and low birth weight, as well as improved economic well-being and personal relationships (SAMHSA, 2001).

BARRIERS TO TREATMENT

Even if pregnant substance users are identified, barriers to treatment remain. The NSDUH found that 6.3 million women needed treatment for alcohol abuse or dependence in 2010, while 3 million women needed treatment for illicit drug problems. However, only 8% of women in need of alcohol treatment and 20% of women in need of drug treatment reported receiving services (SAMHSA, 2011a). Across the survey sample, the most common reasons for not receiving treatment were "not ready to stop using" and "no health coverage and could not afford cost." In previous studies, researchers have found that many female substance users also avoid treatment due to concerns about prosecution, removal of their children, and retaliation from a substance using or violent partner (Ayyagari, Boles, Johnson, & Kleber, 1999; Price & Simmel, 2002).

While some substance abusing women avoid treatment altogether, many others (approximately 60%) drop out of treatment early (Scott-Lennox, Rose, Bohlig, & Lennox, 2000). Risk of treatment drop-out is particularly high among women who are African American, pregnant, have custody of minor children, or are under the age of 21 (Scott-Lennox et al., 2000). To overcome the barriers to treatment and retention, motivational interviewing (MI) techniques can be employed to determine where a client is in her recovery process and encourage her to seek needed help (Handmaker & Wilbourne, 2001). Some hospitals have also begun sensitivity training concerning pregnancy and drug use to minimize stigma (Bland et al., 2001; Carter, 2002).

Not only must the client be motivated to seek treatment, services for pregnant women must also be available and accessible. Currently, only nine states give substance using pregnant women priority access to drug treatment (AZ, GA, KS, MD, MO, OK, TX, UT, WI), while 19 states have created or funded treatment programs specifically for pregnant women (AR, CA, CO, CT, FL, IL, KY, LA, MD, MN, MO, NE, NY, NC, OH, OR, PA, VA, WA) (Guttmacher Institute, 2012). Of those facilities across the country that accept women, just 32% offer programs or groups specific to women, with only 14% offering services for pregnant women (SAMHSA, 2007). Although some states prohibit publicly funded drug treatment programs from discriminating against pregnant women (Guttmacher Institute, 2012), available programs are not necessarily accessible or sensitive to the needs of pregnant or parenting women. The following sections address treatment issues that should be considered in facilities serving pregnant women.

INTERVENTIONS FOR NEWBORNS

After birth, many substance exposed newborns need special care. Infants who are exposed to heroin or other opioids often need to be closely monitored and weaned from their dependence which may require careful administration of a narcotic drug, such as neonatal morphine or buprenorphine to help comfort the baby, prevent seizures, and promote optimal weight gain and development (Drennen, 2010). Newborns that do not require medical care typically go home with a parent or to a foster home. However, immediate and ongoing interventions often are indicated to assist parents in dealing with babies who may have difficulty feeding or regulating their emotions.

Home-based interventions after birth have been associated with fewer behavioral and emotional problems, better developmental outcomes and decreased levels of parenting stress (Butz et al., 2001; Schuler, Nair, & Kettinger, 2003). Similarly, higher scores on cognitive and motor developmental measures have been achieved by children utilizing home-based services compared to control groups not receiving services (Nair, Schuler, Black, Kettinger, & Harrington, 2003).

Early intervention and case management services may also enhance child development and increase positive affect among caregivers during parent-child interactions (Belcher, 2010; Katz, 2010). Intervening early has been shown to have positive effects on many outcomes including children's cognitive development (Frank, Augustyn, Knight, Pell, & Zuckerman, 2001; National AIA Resource Center, 2003) and school readiness (Katz, 2010). Additionally, a recent AIA cross-site evaluation found that infants in families who received child-related services (e.g., infant and child developmental screening, assessment and services) were more likely to be placed with their biological mother at program completion than infants who did not receive such services (Reich & Fuger, 2010).

One promising early intervention model specifically designed to address the speech and language problems associated with substance exposure is Enhanced Mileu Training, or EMT. This training supports responsive interaction between caregiver and child using verbal prompts, social consequences, and expansions of utterances (Katz, 2010). The verbal richness and adult sensitivity provided to at-risk children through EMT has been shown to be positively related to language abilities at 36 months. This finding suggests early intervention techniques like EMT are critical to overcome developmental delays caused by substance exposure.

RELEVANT PUBLIC POLICIES

Many state laws and policies have been established in an attempt to prevent and/or address prenatal substance use. Existent laws address the testing, reporting, prosecution, and receipt of welfare benefits for pregnant women who use drugs. Some state policies are more punitive, focusing primarily on the safety of the child; whereas others are more preventative and consider the health and well-being of the pregnant woman and her newborn.

Newborn Testing and Reporting

Until recently, no federal policy related to perinatal substance use existed. The Keeping Children and Families Safe Act of 2003 reauthorized the federal Child Abuse Prevention and Treatment Act, or CAPTA, requiring states receiving CAPTA grants to comply with the following provisions:

- ensure that medical staff notify child protective services (CPS) of infants identified at birth as affected by prenatal exposure to illegal drugs; and
- develop policies and procedures to address the needs of substance exposed infants and develop plans of safe care for affected infants (Public Law No. 108-36).

The law allows states considerable discretion in determining how the provisions are implemented. For instance, it does not establish a federal definition of child abuse or neglect, although it clearly states that notification should not be construed to "require prosecution for any illegal action (Public Law No.

108-36). Additionally, state, local and agency policies determine how substance exposed newborns are identified, whether an official CPS report is required when referring drug-exposed infants, and the level and type of proof needed to warrant further investigation. On all of these issues, policies vary widely among states. The Guttmacher Institute recently reported that four states (IA, KY, MN, ND) require health care professionals to test for prenatal drug exposure when drug abuse is suspected, while 14 states (AK, AZ, IL, IA, LA, MA, MI, MN, MT, ND, OK, RI, UT, VA) require them to report women to child protective services (CPS) for suspected prenatal substance use (Guttmacher, 2012). Currently, 15 states (AR, CO, FL, IL, IN, IA, LA, MN, NV, RI, SC, SD, TX, VA, WI) consider substance abuse during pregnancy to be child abuse and grounds for termination of parental rights.

Testing and reporting policies can even vary within states. For instance, some hospitals conduct toxicology tests on all pregnant women and/or newborns; whereas most develop protocols for determining who gets tested. Similarly, some child protective services agencies require a positive toxicology test on a newborn to open a case, while others might accept a positive test on just the mother or verbal admission of use. And some hospitals and child welfare agencies respond differently depending on the drug used (e.g., a newborn exposed only to marijuana may be treated differently than one exposed to cocaine). And few child welfare policies even address exposure to alcohol or prescription drugs, which were similarly omitted in the CAPTA legislation. For more information on these policies, the Child Welfare Information Gateway has a regularly updated, searchable database of state child welfare laws that address parental alcohol or other drug use in their child maltreatment definitions (see www.childwelfare.gov).

Prosecution and Mandated Treatment

In addition to the potential removal of their child, some prenatal substance users may face criminal prosecution. Women who are charged for their prenatal behavior have generally been charged with either child endangerment/abuse, illegal drug delivery to a minor or fetal murder/manslaughter. In addition, three states (MN, SD, WI) authorize civil commitment of prenatal drug users and mandate inpatient drug treatment during pregnancy (Guttmacher Institute, 2012).

Loss of Benefits

Currently, many substance using women receive welfare assistance. Although the percentage of low-income, substance-using mothers receiving cash assistance declined from 54% in 1996 to 38% in 2001, illicit drug use was still more than twice as common among welfare recipients than those who did not receive aid (Pollack & Reuter, 2006). Whether or not substance users should receive public aid is a widely debated issue. According to the Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA; Public Law No. 104-193), states are allowed to perform drug testing of welfare recipients and are permitted to deny receipt of benefits to adults convicted of drug felonies. Thus, pregnant women may risk losing welfare benefits if they use substances prenatally.

CONCLUSION

Drug use during pregnancy continues to have detrimental effects at personal, familial, and societal levels. Although disagreements surround the extent to which, and ways in which, in-utero drug exposure harms children, the consensus is that substance use during pregnancy has adverse effects on both children and families.

Women who abuse substances face multiple stressors including poverty, mental illness, and past and present physical, emotional, and sexual abuse. In turn, their children must cope with the consequences of living in a home environment where their developmental needs may not be met and where they are at risk of out-of-home placement. Various laws, policies, and service programs have been developed to address the problems of prenatal drug exposure. However, numerous barriers interfere with attempts to successfully address the multiple issues faced by these families.

Further research is necessary to understand the short- and long-term effects of prenatal drug use, and to tease out the differential effects of prenatal exposure and environment, so that more effective interventions may be developed. A better understanding of the effects of substance exposure on infants will also drive policies guiding the treatment of substance abusing pregnant women and their newborns (Figdor & Kaeser, 1988; Lester et al., 2004). In addition, comprehensive evaluations are needed to better estimate the scope of this problem across racial and socioeconomic groups. The effectiveness of interventions to assist pregnant substance abusers and postpartum mothers and children needs to be established through solid program evaluation, research, and continued governmental support and commitment.

References

Ackerman, J. P., Riggins, T., & Black, M. M. (2010). A review of the effects of prenatal cocaine exposure among school-aged children. *Pediatrics, 125*(3), 554-565.

Alati, R., Al Mamun, A., Williams, G. M., O'Callaghan, M., Najman, J. M., & Bor, W. (2006). In-utero alcohol exposure and prediction of alcohol disorders in early adulthood: A birth cohort study. *Archives of General Psychiatry, 63*(9), 1009-1016.

American Society of Addiction Medicine. (2011, July 11). *Women, alcohol and other drugs, and pregnancy* [Public Policy Statement]. Retrieved from http://www.asam.org/advocacy/find-a-policy-statement/view-policy-statement/public-policy-statements/2011/12/15/women-alcohol-and-other-drugs-and-pregnancy

Arendt, R. E., Short, E. J., Singer, L. T., Minnes, S., Hewitt, J., Flynn, S. Flannery, D. (2004). Children prenatally exposed to cocaine: Developmental outcomes and environmental risks at seven years of age. *Journal of Developmental and Behavioral Pediatrics, 25*(2), 83-90.

Arria, A. M., Derauf, C., LaGasse, L. L., Grant, P., Shah, R., Smith, L. Lester, B. (2006). Methamphetamine and other substance use during pregnancy: Preliminary estimates from the Infant Development, Environment and Lifestyles (IDEAL) Study. *Maternal and Child Health Journal, 10*(3), 293-302.

Asanbe, C. B., & Lockert, E. (2006). Cognitive abilities of African American children with prenatal cocaine/polydrug exposure. *Journal of Health Care for the Poor and Underserved, 17*(2), 400-412.

Ayyagari, S., Boles, S., Johnson, P., & Kleber, H. (1999). Difficulties in recruiting pregnant substance abusing women into treatment: Problems encountered during the Cocaine Alternative Treatment Study. *Abstract Book/Association for Health Services Research, 16*, 80-81.

Barnard, M., & McKeganey, N. (2004). The impact of parental problem drug use on children: What is the problem and what can be done to help. *Addiction (Abingdon, England), 99*, 552–559.

Behnke, M., Eyler, F. D., Warner, T. D., Garvan, C. W., Hou, W., & Wobie, K. (2006). Outcome from a prospective longitudinal study of prenatal cocaine use: Preschool development at 3 years of age. *Journal of Pediatric Psychology, 31*(1), 41-49.

Belcher, H. (2010, June). *Effective interventions for newborns with drug exposure and their families*. Presentation at the National AIA Resource Center Substance Exposed Newborns Conference, Alexandria, VA.

Belcher, H. M., Butz, A. M., Wallace, P., Hoon, A. H., Reinhardt, E., Reeves, S. A., & Pulsifer, M. B. (2005). Spectrum of early intervention services for children with intrauterine drug exposure. *Infants & Young Children, 18*(1), 2-15.

Bennett, A. D. (1999). Perinatal substance abuse and the drug-exposed neonate Advance for *Nurse Practitioners, 7*(5), 32–37.

Bland, E., Oppenheimer, L., Brisson-Carroll, G., Morel, C., Holmes, P., & Gruslin, A. (2001). Influence of an educational program on medical students' attitudes to substance use disorders in pregnancy. *American Journal of Drug and Alcohol Abuse, 27*(3), 483-490.

Boyd, C., & Holmes, C. (2002). Women who smoke crack and their family substance abuse problems. *Health Care for Women International, 23*(6/7), 576-586.

Brady, T. M., & Ashley, O. S. (2005). *Women in substance abuse treatment: Results from the Alcohol and Drug Services Study (ADSS)*. Rockville, MD: SAMHSA, Office of Applied Statistics. Retrieved from http://oas.samhsa.gov/WomenTX/WomenTX.htm

Bride, B. (2001). Single-gender treatment of substance abuse: Effect on treatment retention and completion. *Social Work Research, 25*(4), 223-232.

Burden, M. J., Westerlund, A., Muckle, G., Dodge, N., Dewailly, E., Nelson, C. A. Jacobson, J. L. (2011). The effects of maternal binge drinking during pregnancy on neural correlates of response inhibition and memory in childhood. *Alcoholism: Clinical and Experimental Research, 35*(1), 69-82.

Butz, A., Pulsifer, M., Marano, N., Belcher, H., Lears, M., & Royall, R. (2001). Effectiveness of a home intervention for perceived child behavioral problems and parenting stress in children with in-utero drug exposure. *Archives of Pediatric and Adolescent Medicine, 155*, 1029-1037.

Carpenter, L. (2010, June). *Nature of the problem and state of the field.* Presentation at the National AIA Resource Center Substance Exposed Newborns Conference, Alexandria, VA.

Carta, J., Atwater, J., Greenwood, C., McConnell, S., McEvoy, M., & Williams, R. (2001). Effects of cumulative prenatal substance exposure and environmental risks on children's developmental trajectories. *Journal of Clinical Child Psychology, 30*(3), 327-337.

Carter, C. (2002). Perinatal care for women who are addicted: Implications for empowerment. *Health and Social Work, 27*(3), 166-174.

Centers for Disease Control and Prevention. (2002). *IDU HIV Prevention. Methadone Maintenance Treatmen*t. Retrieved from http://www.cdc.gov/idu/facts/methadonefin.pdf

Centers for Disease Control and Prevention. (2011a). Facts about FASDs. Retrieved from http://www.cdc.gov/ncbddd/fasd/facts.html

Centers for Disease Control and Prevention. (2011b). Fetal Alcohol Spectrum Disorders: Data and statistics. Retrieved from http://www.cdc.gov/ncbddd/fasd/data.html

Chang, L., Cloak, C., Jiang, C. S., Farnham, S., Tokeshi, B., Buchthal, S. Ernst, T. (2009). Altered neurometabolites and motor integration in children exposed to methamphetamine in utero. *Neuroimage, 48*(2), 391-397.

Chasnoff, I. J., Wells, A. M., McGourty, R. F., & Bailey, L. K. (2007). Validation of the 4P's Plus screen for substance use in pregnancy validation of the 4P's Plus. *Journal of Perinatology, 27*(12), 744-748.

Child Abuse Prevention and Treatment Act. (2003). Public Law No: 108-36.

Child Health and Development Institute of Connecticut. (2006, April). *Caring for a child who has been affected by substance abuse.* [Fact Sheet]. Retrieved from http://www.chdi.org/childrenimpactedbysubstanceabuse

Clark, H. (2001). Residential substance abuse treatment for pregnant and postpartum women and their children: Treatment and policy implications. *Child Welfare, 80*(2), 179-198.

Claus, R. E., Orwin, R. G., Kissin, W., Krupski, A., Campbell, K., & Stark, K. (2007). Does gender-specific substance abuse treatment for women promote continuity of care? *Journal of Substance Abuse Treatment, 32*, 27-39.

Cocozza, J. J., Jackson, E. W., Hennigan, K., Morrissey, J. P., Reed, B. G., Fallot, R., & Banks, S. (2005). Outcomes for women with co-occuring disorders and trauma: program level effects. *Journal of Substance Abuse Treatment, 28*(2), 109-119.

Coles, C. D., & Black, M. M. (2006). Introduction to the special issue: Impact of prenatal substance exposure on children's health, development, school performance and risk behavior. *Journal of Pediatric Psychology, 31*(1), 1-4.

Cone-Wesson, B. (2005). Prenatal alcohol and cocaine exposure: Influences on cognition, speech, language, and hearing. *Journal of Communication Disorders, 38*(4), 279-302.

Covington, C. Y., Nordstrom-Klee, B., Ager, J., Sokol, R., & Delaney-Black, V. (2002). Birth to age 7 growth of children prenatally exposed to drugs: A prospective cohort study. *Neurotoxicology and Teratology, 24*(4), 489-496.

Czerkes, M., Blackstone, J., & Pulvino, J. (2010). *Buprenorphine versus methadone treatment for opiate addition in pregnancy, an evaluation of neonatal outcomes*. Paper presented at the American Congress of Obstetricians and Gynecologists 58th Annual Clinical Meeting, San Francisco, CA. Retrieved from http://www.mainehealth.org/workfiles/mmc_residencies/OBGYN/Czerkesresearchproject.ppt

Datner, E. M., Wiebe, D. J., Brensinger, C. M., & Nelson, D. B. (2007). Identifying pregnant women experiencing domestic violence in an urban emergency department. *Journal of Interpersonal Violence, 22*(1), 124-135.

Day, N. L., Goldschmidt, L., & Thomas, C. A. (2006). Prenatal marijuana exposure contributes to the prediction of marijuana use at age 14. *Addiction, 101*(9), 1313-1322.

Day, N. L., Richardson, G. A., Geva, D., & Robles, N. (2006). Alcohol, marijuana, and tobacco: Effects of prenatal exposure on offspring growth and morphology at age six. *Alcoholism: Clinical and Experimental Research, 18*(4), 786-794.

DeNavas-Walt, C., Proctor, B. D., & Smith, J. C. (2011). *Income, poverty, and health insurance coverage in the United States: 2010*. Washington, DC: U.S. Census Bureau. Retrieved from http://www.census.gov/prod/2011pubs/p60-239.pdf

Drake, R. E., Mueser, K. T., Brunette, M. F., & McHugo, G. J. (2004). A review of treatments for people with severe mental illnesses and co-occurring substance use disorders. *Psychiatric Rehabilitation Journal, 27*, 360-74.

Drennen, B. (2010). *Caring for drug-exposed infants*. Seattle, WA: Classic Day Publishing.

Ebrahim, S., & Gfroerer, J. (2003). Pregnancy-related substance use in the United States during 1996-1998. *Obstetrics and Gynecology, 101*(2), 374-379.

Fals-Stewart, W., & Kennedy, C. (2005). Addressing intimate partner violence in substance-abuse treatment. *Journal of Substance Abuse Treatment, 29*(1), 5-17.

Figdor, E., & Kaeser, L. (1998). Concerns mount over punitive approaches to substance abuse among pregnant women. *Guttmacher Report on Public Policy, 1*(5), 3-5.

Flavin, J. (2002). A glass half full? Harm reduction among pregnant women who use cocaine. *Journal of Drug Issues, 32*(3), 973-998.

Floyd, R. L., Jack, B. W., Cefalo, R., Atrash, H., Mahoney, J., Herron, A...Sokol, R. J. (2008, December). The clinical content of preconception care: Alcohol, tobacco, and illicit drug exposures. *American Journal of Obstetrics & Gynecology* (suppl.), S333-S339.

Flynn, L. (1999). The adolescent parenting program: Improving outcomes through mentorship. *Public Health Nursing, 16*(3), 182-189.

Frank, D., Augustyn, M., Knight, W., Pell, T., & Zuckerman, B. (2001). Growth, development and behavior in early childhood following prenatal cocaine exposure: A systematic review. *Journal of the American Medical Association, 285*(12), 1613-1625.

Fried, P. A., & Smith, A. M. (2001). A literature review of the consequences of prenatal marihuana exposure: An emerging theme of a deficiency in aspects of executive function. *Neurotoxicology and Teratology, 23*, 1-11

Friguls, B., Joya, X., Garcia-Algar, O., Pallas, C. R., Vall, O., & Pichini, S. (2010). A comprehensive review of assay methods to determine drugs in breast milk and the safety of breastfeeding when taking drugs. *Analytical and Bioanalytical Chemistry, 397*(3), 1157-1179.

Fuger, K. L., Abel, M. B., & Stephens, D. J. (2009). *Abandoned Infants Assistance Program: Cross-site evaluaton report summary, fiscal year 2007: October 1, 2006-September 30, 2007*. Kansas City, MO: University of Missouri-Kansas City Institute for Human Development.

Goldschmidt, L., Day, N. L. & Richardson, G. A. (2000). Effects of prenatal marijuana exposure on child behavior problems at age 10. *Neurotoxicology and Teratology*, *22*(3), 325-336.

Goldschmidt, L., Richardson, G. A., Cornelius, M. D., & Day, N. L. (2004). Prenatal marijuana and alcohol exposure and academic achievement at age 10. *Neurotoxicology and Teratology, 26*(4), 521-532.

Goldschmidt, L., Richardson, G. A., Stoffer, D. S., Geva, D., & Day, N. L. (2006). Prenatal alcohol exposure and academic achievement at age six: A nonlinear fit. *Alcoholism: Clinical and Experimental Research, 20*(4), 763-770.

Gray, K. A., Day, N. L., Leech, S., & Richardson, G. A. (2005). Prenatal marijuana exposure: Effect on child depressive symptoms at ten years of age. *Neurotoxicology and Teratology, 27*(3), 439-448.

Gray, T. R., Eiden, R. D., Leonard, K. E., Connors, G. J., Shisler, S., & Huestis, M. A. (2010). Identifying prenatal cannabis exposure and effects of concurrent tobacco exposure on neonatal growth. *Clinical Chemistry, 56*, 1442-1450.

Greenfield, S. F., Brooks, A. J., Gordon, S. M., Green, C. A., Kropp, F., McHugh, R. K. Miele, G. M. (2007). Substance abuse treatment entry, retention, and outcome in women: A review of the literature. *Drug and Alcohol Dependence, 86*(5), 1-21.

Gupta, P. (2001). The public health impact of tobacco. *Current Science, 81*(5), 475-481.

Guttmacher Institute. (2012, January) *State policies in brief: Substance abuse during pregnancy* [Fact Sheet]. New York: Author. Retrieved from http://www.guttmacher.org/statecenter/spibs/spib_SADP.pdf

Handmaker, N., & Wilbourne, P. (2001). Motivational interventions in prenatal clinics. *Alcohol Research and Health, 25*(3), 219-229.

Hans, S. L. (2002). Studies of prenatal exposure to drugs: Focusing on parental care and children. *Neurotoxicology and Teratology, 24*(3), 329-337.

Horsfall, J., Clearly, M., Hunt, G.E., & Walter, G. (2009). Psychosocial treatments for people with co-occurring severe mental illness and substance use disorders (dual diagnosis): A review of the empirical evidence. *Harvard Review of Psychiatry, 17*(1), 24-34.

Howell, K. K., Lynch, M. E., Platzman, K. A., Smith, G. H., & Coles, C. D. (2006). Prenatal alcohol exposure and ability, academic achievement, and school functioning in adolescence: A longitudinal follow-up. *Journal of Pediatric Psychology, 31*(1), 116-126.

Huntington, N., Moses, J. D., & Veysey, B. M. (2005). Developing and implementing a comprehensive approach to serving women with co-occurring disorders and histories of trauma. *Journal of Community Psychology, 33*(4), 395-410.

Jaeger, N. (2010). *Problem solving courts: Collaboration*. Presentation at the National AIA Resource Center Substance Exposed Newborns Conference, Alexandria, VA.

Jones, H. E., Kaltenbach, K., Heil, S. H., Stine, S. M., Coyle, M. G., Aria, A. M. Fischer, G. (2010). Neonatal abstinence syndrome after methadone or buprenorphine exposure. *The New England Journal of Medicine, 363*, 2320-2331.

Kalberg, W. O., Provost, B., Tollison, S. J., Tabachnick, B. G., Robinson, L. K., Hoyme, H. E. May, P. A. (2006). Comparison of motor delays in young children with fetal alcohol syndrome to those with prenatal alcohol exposure and with no prenatal alcohol exposure. *Alcoholism: Clinical and Experimental Research, 30*(12), 2037-2045.

Kalotra, C. J. (2002). *Estimated costs related to the birth of a drug and/or alcohol exposed baby*. Washington, DC: Office of Justice Programs Drug Court Clearinghouse and Technical Assistance Project, American University. Retrieved from http://www1.spa.american.edu/justice/documents/215.pdf

Kandall, S. (1993). *Improving treatment for drug-exposed infants: Treatment Improvement Protocol (TIP) Series 5*. DHHS Publication No. (SMA) 93-2011. Retrieved from http://www.ncbi.nlm.nih.gov/bookshelf/br.fcgi?book=hssamhsatip&part=A24127

Katz, L. (2010, June). *Early intervention strategies with babies and toddlers born prenatally cocaine exposed: Areas of focus and hope*. Presentation at the National AIA Resource Center Substance Exposed Newborns Conference, Alexandria, VA.

Kauffman, S. E., Silver, P., & Poulin, J. (1997). Gender differences in attitudes toward alcohol, tobacco, and other drugs. *Social Work, 42*(3), 231-241.

Kelly, Y. J., Sacker, A., Gray, R., Kelly, J., Wolke, D., Head, J., & Quigley, M. A. (2010). Light drinking during pregnancy: Still no increased risk for socioemotional difficulties or cognitive deficits at 5 years of age? *Journal of Epidemiological Community Health*. doi:10.1136/jech.2009.103002

Kennedy, C., Finkelstein, N., Hutchins, E., & Mahoney, J. (2004). Improving screening for alcohol use during pregnancy: The Massachusetts ASAP Program. *Maternal and Child Health Journal, 8*(3), 137-147.

Kissin, W., Svikis, D., Morgan, G., & Haung, N. (2001). Characterizing drug dependent women and their children. *Journal of Substance Abuse Treatment, 21*(1), 27-34.

Lansford, J. E., Dodge, K. A., & Pettit, G. S. (2010). Does physical abuse in early childhood predict substance use in adolescence and early adulthood? *Child Maltreatment, 15*(2), 190-194.

Larsson, M., & Montgomery, S. M. (2010). Maternal smoking during pregnancy and physical control among offspring. *Journal of Epidemiology and Community Health, 65*(12, 1151-1158.

Lester, B., Andreozzi, L., & Appiah, L. (2004). Substance use during pregnancy: Time for policy to catch up with research. *Harm Reduction Journal, 1*(5), 1-44.

Lewis, B. A., Kirchner, L. H., Short, E. J., Minnes, S., Weishampel, P. Satayathum, S., & Singer, L. T. (2007). Prenatal cocaine and tobacco effects on children's language trajectories. *Pediatrics, 120*(1), e75-e85.

Lewis, M. W., Misra, S., Johnson, H. L., & Rosen, T. S. (2004). Neurological and developmental outcomes of prenatally cocaine-exposed offspring from 12 to 36 months. *The American Journal of Drug and Alcohol Abuse, 30*(2), 299-320.

Lester, B., Tronick, E., Gasse, L., & Seifer, R. (2002). The maternal lifestyle study: Effects of substance exposure during pregnancy on neurodevelopmental outcomes in 1-month-old infants. *Pediatrics, 110*(6), 1182-1192.

Lown, E. A., Nayak, M. B., Korcha, R. A., Greenfield, T. K. (2011). Child physical and sexual abuse: A comprehensive look at alcohol consumption patterns, consequences, and dependence from the National Alcohol Survey. *Alcoholism: Clinical and Experimental Research, 35*(2), 317-325.

Lupton, C., Burd, L., & Harwood, R. (2004). Cost of fetal alcohol spectrum disorders. *American Journal of Medical Genetics, Part C, Seminars in Medical Genetics, 127C*(1), 42-50.

Messinger, D. S., Bauer, C. R., Das, A., Seifer, R., Lester, B. M., Lagasse, L. L. Poole, W. F. (2004). The Maternal Lifestyle Study: Cognitive, motor, and behavioral outcomes of cocaine-exposed and opiate-exposed infants through three years of age. *Pediatrics, 113*(6), 1677-1685.

McGee, C. L., Bjorkquist, O. A., Riley, E. P., & Mattson, S. N. (2009). Impaired language performance in young children with heavy prenatal alcohol exposure. *Neurotoxicology and Teratology, 31*(2), 71-75.

McKeganey, N., Barnard, M., & McIntosh, J. (2002). Paying the price for their parents' addiction: Meeting the needs of the children of drug-using parents. *Drugs: Education, Prevention, and Policy, 9*(3), 233-246.

Morgan, M. A., Cragan, J. D., Goldenberg, R. L., Rasmussen, S. A., & Schulkin, J. (2010). Management of prescription and nonprescription drug use during pregnancy. *Journal of Maternal Fetal Neonatal Medicine, 23*(8), 813-819.

Nair, P., Schuler, M. E., Black, M. M., Kettinger, L., & Harrington, D. (2003). Cumulative environmental risk in substance abusing women: Early intervention, parenting stress, child abuse potential and child development. *Child Abuse & Neglect, 27*(9), 997-1017.

National Abandoned Infants Assistance Resource Center. (2003). *AIA best practices: Lessons learned from a decade of service to children and families affected by HIV and substance abuse*. Retrieved from http://aia.berkeley.edu/media/pdf/best_practices_monograph.pdf

National Abandoned Infants Assistance Resource Center. (2003). *Literature review: Effects of prenatal substance exposure on infant and early childhood outcomes*. Retrieved from http://aia.berkeley.edu/media/pdf/prenatal_substance_exposure_review.pdf

National Institute on Drug Abuse. (2009, May). Prenatal exposure to drugs of abuse. Retrieved March 22, 2010, from http://www.drugabuse.gov/tib/prenatal.html

Nocon, J. (2010, June). *Incorporating screening for substance use into routine prenatal care*. Presentation at the National AIA Resource Center Substance Exposed Newborns Conference, Alexandria, VA.

NPC Research. (2007, March). *Family Treatment Drug Court final report*. Retrieved from http://www.npcresearch.com/Files/FTDC_Evaluation_Final_Report.pdf

O'Connor, M. J., Kogan, N., & Findlay, R. (2006). Prenatal alcohol exposure and attachment behavior in children. *Alcoholism: Clinical and Experimental Research, 26*(10), 1592-1602.

O'Connor, P. G., Nyquist, J. G., & McLellan, A. T. (2011). Integrating addiction medicine into graduate medical education in primary care: The time has come. *Annals of Internal Medicine, 154*(1), 56-59.

Personal Responsibility and Work Opportunity Reconciliation Act. (1996). Public Law No. 104-193.

Pollack, H. A., & Reuter, P. (2006). Welfare receipt and substance-abuse treatment among low-income mothers: The impact of welfare reform. *American Journal of Public Health, 96*(11), 2024-2031.

Price, A. & Simmel, C. (2002). *Partners' influence on women's addiction and recovery: The connection between substance abuse, trauma and intimate relationships.* Berkeley, CA: National Abandoned Infants Assistance Resource Center.

Porowski, A. W., Burgdorf, K., & Herrell, J. M. (2004). Effectiveness and sustainability of residential substance abuse treatment programs for pregnant and parenting women. *American Journal of Drug and Alcohol Abuse, 30*(3), 537-550.

Reich, W. & Fuger, K. L. (2010, June). *AIA Cross-Site evaluation findings: Impact study of AIA services on family stability*. Presentation at the National AIA Resource Center Substance Exposed Newborns Conference, Alexandria, VA.

Reynolds, E. W., Riel-Romero, R. M. S., & Bada, H. S. (2007). Neonatal abstinence syndrome and cerebral infarction following maternal codeine use during pregnancy. *Clinical Pediatrics, 46*(7), 639-645.

Ryan, J. P., Choi, S., Hong, J. S., Hernandez, P., & Larrison, C. R. (2008). Recovery coaches and substance exposed births: An experiment in child welfare. *Child Abuse & Neglect, 32*(11), 1072-1079.

Ryan, J. P., Marsh, J. C., Testa, M. F., & Louderman, R. (2006). Integrating substance abuse treatment and child welfare services: Findings from the Illinois Alcohol and Other Drug Abuse Waiver Demonstration. *Social Work Research, 30*(2), 95-107.

Sawani, H., Olsen, E., & Simakajorboon, N. (2010). The effect of in utero cigarette smoke exposure on development of respiratory control: A review. *Pediatric Allergy, Immunology, and Pulmonology, 23*(3), 161-167.

Schuler, M., Nair, P., & Kettinger, L. (2003). Drug-exposed infants and developmental outcome: Effects of a home intervention and ongoing maternal drug use. *Archive of Pediatric and Adolescent Medicine, 157*(2), 133-138.

Scott-Lennox, J., Rose, R., Bohlig, A., & Lennox, R. (2000). The impact of women's family status on completion of substance abuse treatment. *Journal of Behavioral Health Services and Research, 27*(4), 366-379.

Semidei, J., Radel, L., & Nolan, C. (2001). Substance abuse and child welfare: Clear linkages and promising responses. *Child Welfare, 80*(2), 109-128.

Shankaran, S., Bann, C., Bauer, C. R., Lester, B., Bada, H., Das, A. Woldt, E. (2010). Prenatal cocaine exposure and body mass index and blood pressure at 9 years of age. *Journal of Hypertension, 28*(6), 1166-1175.

Shankaran, S., Das, A., Bauer, C. R., Bada, H. S., Lester, B., Wright, L. L. Smeriglio, V. (2004). Association between patterns of maternal substance use and infant birth weight, length, and head circumference. *Pediatrics, 114*(2), 226-234.

Singer, L. T., Arendt, R., Minnes, S., Farkas, K., Salvator, A., Kirchner, H. L. Kliegman, R. (2002). Cognitive and motor outcomes of cocaine-exposed infants. *JAMA, 287,* 1952-1960.

Singer, L. T., Minnes, S., Short, E., Arendt, R., Farkas, K., Lewis, B. Kirchner, H. L. (2004). Cognitive outcomes of preschool children with prenatal cocaine exposure. *JAMA, 291,* 2448-2456.

Smith, D. K., Johnson, A. B., Pears, K. C., Fisher, P. A., & DeGarmo, D. S. (2007). Child maltreatment and foster care: Unpacking the effects of prenatal and postnatal parental substance use. *Child Maltreatment, 12*(2), 150-160.

Smith, L., Yonekura, M. L., Wallace, T., Berman, N., Kuo, J., & Berkowitz, C. (2003). Effects of prenatal methamphetamine exposure on fetal growth and drug withdrawal symptoms in infants born at term. *Journal of Developmental and Behavioral Pediatrics, 24*(1), 17-23.

Sokol, R. J., Martier, S. S., & Ager, J. W. (1989). The T-ACE questions: Practical prenatal detection of risk-drinking. *American Journal of Obstetrics and Gynecology, 160*(4), 863-870.

Sowell, E. R., Leow, A. D., Bookheimer, S. Y., Smith, L. M., O'Connor, M. J., Kan, E. Thompson, P. M. (2010). Differentiating prenatal exposure to methamphetamine and alcohol versus alcohol and not methamphetamine using tenor-based brain morphometry and discriminant analysis. *The Journal of Neuroscience, 30*(11), 3876-3885.

Substance Abuse and Mental Health Services Administration. (2001). *Benefits of residential substance abuse treatment for pregnant and parenting women*. Rockville, MD: U.S. Department of Health and Human Services.

Substance Abuse and Mental Health Services Administration. (2006). *Facilities offering special programs or groups for women: 2005.* Retrieved from http://www.oas.samhsa.gov/2k6/womenTx/womenTX.htm

Substance Abuse and Mental Health Services Administration. (2007). *Substance use treatment among women of childrearing age.* Retrieved from http://oas.samhsa.gov/2k7/womenTX/womenTX.cfm

Substance Abuse and Mental Health Services Administration. (2011a). *Results from the 2010 National Survey on Drug Use and Health: National findings.* Retrieved from http://oas.samhsa.gov/NSDUH/2k10NSDUH/2k10Results.htm

Substance Abuse and Mental Health Services Administration. (2011b). *Substance abuse treatment admissions receiving public assistance*. Retrieved from http://oas.samhsa.gov/2k11/300/300PubAssist2k11.htm

Substance Abuse and Mental Health Services Administration. (2010). Substance use treatment need and receipt among people living in poverty. Retrieved from http://www.oas.samhsa.gov/2k10/173/173Poverty.htm

U.S. Department of Health and Human Services. (2001). *1998 National estimates of the number of boarder babies, abandoned infants and discarded infants*. Washington D.C.: U.S. Government Printing Office.

Watson, E. (2010). The evolution and application of the 5 P'S Behavioral Risk Screening Tool. *The Source, 29*(2), 27-29.

Watson, E., Barnes, H., Brown, E. Kennedy, C. & Finkelstein, N. (2003). *Alcohol screening assessment in pregnancy: The ASAP curriculum*. Cambridge, MA: The Institute for Health and Recovery.

Watson, E., Funk, K., & Twombly, L. (2010). Using the peer recovery model with mothers of substance-exposed newborns identified through CAPTA requirements. *The Source, 20*(1), 15-19.

Weisdorf, T., Parran, T., Graham, A., & Snyder, C. (1999). Comparison of pregnancy-specific interventions to a traditional treatment program for cocaine-addicted pregnant women. *Journal of Substance Abuse Treatment, 16*(1), 39-45.

Wright, A., & Walker, J. (2001). Drugs of abuse in pregnancy. *Best Practice and Research in Clinical Obstetrics and Gynecology, 15*(6), 987-998.

Yew, E. (2010, June). *The family wellness court for infants and toddlers* [PowerPoint slides]. Retrieved from www.cwda.org/downloads/tools/americanpoverty/JudgeYew.ppt

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