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Alcohol use during pregnancy: Considerations for Australian policy

Fetal Alcohol Spectrum Disorder (FASD), associated with alcohol use during pregnancy, is characterised by structural brain abnormalities, and deficits in growth and neurological development resulting in a range of life long problems and disabilities (Streissguth et al., 2004). FASD has its primary origins in damage to the developing central nervous system and this structural damage is irreversible (Streissguth, Barr, Kogan, & Bookstein, 1996). FASD often presents as behavioural problems, however, these are secondary disabilities (Streissguth et al., 1996). Individuals with FASD have a reduced ability to function on a day to day basis, increased physical and mental health concerns leading to disrupted schooling and employment, reduced ability to live independently, increased risk of involvement with the law, and a higher level of substance abuse, unintended pregnancy, sexually transmitted disease, and injury (Streissguth et al., 1996; Streissguth et al., 2004).

Advice surrounding alcohol use during pregnancy has a long history appearing as early as ancient Greece and Roman times (Jones & Smith, 1973). More recently, the association between alcohol use during pregnancy and infant health was reported in a scientific publication in 1899 by Dr William Sullivan who proposed that the stillbirths of alcoholic prisoners in a Liverpool prison were caused by alcohol (Sullivan, 1899). Subsequent observations were reported around seventy years later in France (Lemoine P., Harousseau, Borteyru, & Menuet, 1968), the USA (Ulleland, 1972), Germany (Majewski et al., 1976) and in Sweden (Olegard et al., 1979) by researchers who noted the distinctive characteristics of children of alcoholic mothers were similar between children who did not have a genetic connection, suggesting damage during the prenatal period. The term Fetal Alcohol Syndrome (FAS) was recommended by dysmorphologists Jones and Smith (Jones & Smith, 1973) to identify the causal agent and to encourage prevention (Clarren, 2005).

Research contribution to policy development

The impact of alcohol on the developing fetus is supported by strong evidence. Research clearly shows that the concentration of alcohol entering the maternal system is the same as

that carried to the fetus due to the direct blood supply between mother and fetus (Guerri, 2002). Certain critical brain development processes occur on set days in embryonic development, brain development processes are linear and if an earlier stage is disrupted then it has flow on impact on later brain development; and research reports that the risk of fetal alcohol damage occurs throughout pregnancy as brain development occurs throughout pregnancy (and beyond) (Guerri, Bazinet, & Riley, 2009). Images of structural brain damage in FAS affected infant indicates less white and grey matter, less brain surface, fewer connections between the brain, less convolutions and smaller brain size (Guerri et al., 2009). These modifications to grey matter effect the functional capacity of the brain, while modification to the white matter effect cognition and the coordination of messages between different regions of the brain resulting in string of possible secondary physical, cognitive, mental health, behavioural, and social outcomes.

There is also some emerging evidence from animal studies that can contribute to policy development in this area. Haycock in his study of epigenetics, recognises the impact of alcohol consumption in the preconception period which causes DNA damage to sperm and ova, by 'switching on' genes that may otherwise have remained dormant (Haycock, 2009) and this has a flow on effects to fetal and child health outcomes. Data from human studies further illustrates the possible paternal contribution to FASD development, with paternal alcohol consumption resulting in offspring with reduced cognitive ability (Hegedus, Alterman, & Tarter, 1984). Further, animal studies support the impact of paternal alcohol consumption on physical and mental development of offspring even in the absence of maternal alcohol exposure (Ouko et al., 2009). These research findings suggest that alcohol prevention for both parents, starting during preconception, will be critical to FASD prevention. Further emerging research suggesting various (known and unknown) maternal, fetal, and paternal factors can enhance or protect and therefore moderate the impact of fetal exposure to alcohol. One of these factors, choline supplementation, has been shown to reduce learning deficits and spacial working memory during and after prenatal alcohol consumption in animal studies (Thomas, 2011). Other factors such as (but not limited to) maternal socio-economic background, age, previous pregnancies and births, stress, nutrition, body weight, metabolism, other drug use,

depression and social relationships have also been implicated in moderating fetal alcohol exposure resulting in FASD (P. May & Gossage, 2011).

The social determinates research spotlights reasons for alcohol use during pregnancy and is important in the development of well-considered policy approach to address the prevention of FASD. Several of these risk factors also have a level of implicit partner involvement: custodial changes, current drug use in home, and violence exposure (Delaney-Black et al., 2000), further highlighting the need to involve both potential parents in policy and prevention. Building on this, additional research notes that male partners can have an important impact on maternal alcohol consumption during pregnancy through social facilitation (Abel, 2004). Australian data indicates that women are most likely to drink in their own home or at the home of a friend; that over 75% of women who drink during pregnancy usually drink with their partner, with partner initiating a drinking occasion nearly 40% of the time (McBride, Carruthers, & Hutchinson, 2012). It is therefore, important to recognise that decisions about alcohol use during pregnancy are not the sole province of women, but occur within the context of the home and social environment. Australian per capita alcohol consumption is high by world standards (Organisation, 2011) and therefore alcohol use during pregnancy and the circumstances that support alcohol use during pregnancy are important policy issues, involving a range of behaviours that occur and are often supported by complex social and cultural circumstances.

As well as emerging research, there is also a lack of existing research evidence in some areas of FASD and alcohol use during pregnancy that are required to inform effective policy. For example, the impact of low level alcohol use during preconception, pregnancy and breastfeeding is relatively unknown. At present there is little human research revealing the level of alcohol consumption, if any, that may be considered low risk for the developing fetus (O'Leary, Zubrick, Taylor, Dixon, & Bower, 2009) and therefore is open for interpretation during policy development as illustrated below.

As with any well designed policy guided prevention planning, findings from evidence based reviews of the international research intervention literature should be incorporated. However, literature reviews show that there is a dearth of evidence about what works in terms of preventing and responding to FASD. Recent reviews of random control/clinical trials suggest the importance of individual brief interventions in clinical settings (Stade et al., 2009), however, there is limited information on the impact of larger scale community intervention such as warning labels and taxation, suggesting the need for more intervention research. Much of the intervention activity currently conducted is based on clinical and practice wisdom rather than scientific evidence. Although not evidenced-based, clinical and practice wisdom can play a part in guiding initial formative development of interventions which can then be tested in a more scientific manner to assess behaviour change (McBride, Farrington, Muleners, & Midford, 2006), and this style of formative work is an important starting point for funding of FASD research in Australia. In recent years, there has been exponential growth in the national and international availability of clinical and practice wisdom based FASD resources. A recent review of international FASD resources from English speaking countries reports that resources have been generated in Australia, the United Kingdom, Ireland, the United States of America (USA), Canada, South Africa and New Zealand, and from key international health organisation such as the World Health Organisation, Eurocare (Roarty et al., 2013). In most cases these resources are readily available online (Roarty et al., 2013).

Interestingly, funding for FASD prevention research is also relatively recent. This can be partially explained by the different focus between countries. For example, the USA and Canada started focusing on FASD as a public health issue about a decade earlier than Australia, however research funding in these countries focused primarily on prevalence, diagnosis and treatment rather than prevention (Roarty et al., 2013).

A recent review of several FASD prevalence studies reports that a higher proportion of the population is affected by less severe FASD outcomes than those affected by FAS (PA May et al., 2011). If this pattern also proves to be in play in Australia then it has implications for policy and funding recommendations as it introduces the issue of the prevention paradox. The

prevention paradox comes into play when more harm may be prevented by targeting a larger although lower consuming proportion of the population (Hawks, 1989). The interplay between this and future research on the impact of low and moderate use of alcohol during pregnancy, is an issue which will need clarification for future policy.

Defined and emerging research in these and other areas of FASD has an impact on well considered policy development. It is therefore essential that the knowledge basis of policy and intervention systematically incorporates new research as it becomes available, particularly research that is methodologically sound, has been replicated over several years in several jurisdictions, and where possible, with human populations.

FASD in the Australian Context

The World Health Organisation recognises, and has done for over 10 years, that alcohol use during pregnancy which results in FAS, is the leading cause of environmental-related birth defects and mental retardation in the Western World (World Health Organisation, 1999). Determining prevalence is therefore an important contribution to policy considerations as it assists in determining emphasis and funding for prevention and treatment. However, Australia has no nationally developed processes to diagnose FAS or assess prevalence. In the US, current prevalence rates of FAS, using various diagnostic reporting methodologies, range from 0.2-1.5 cases per 1000 live births (Olsen et al., 2009) and between 1.5 to 2.5 per 1,000 births among some Native American tribes (US Department of Health and Human Services, 2007). In Australia, recent estimates based on a limited number of jurisdictions suggests a prevalence rate of 0.06 per 1000 live births (under 15 years) and an Indigenous rate of 8.11 per 1000 (Elliott, Payne, Morris, Haan, & Bower, 2008). The USA has a higher recorded prevalence rate of FAS than Australia, however Australia has a higher rate of drinking among women of childbearing age and pregnant women than the US (Kyskan & Moore, 2005). It is therefore likely that the majority of FAS cases remain undiagnosed, not only because the process of diagnosis is difficult and is inconsistently applied in Australia, but that up until recently it was unsupported by national policy. Consequently, there is a need to develop effective reporting processes to clarify FAS prevalence rates, using active diagnostic systems,

in a variety of populations and jurisdictions within Australia, and to develop and implement effective diagnostic activity in Australia.

Australia may not have accurately and adequately diagnosed, recorded, treated and prevented such a critical, and preventable, public health issue for several decades for several reasons. Part of this may be that infants and children impacted upon by fetal alcohol effects are diagnosed under other disabilities and receive funding and services under these alternative classifications. In Western Australia, for example, there is a particularly high recorded prevalence of Attention Deficit and Hyperactivity Disorder (ADHD) (Buckmaster, 2004), shared to a lesser extent with other states of Australia (Buckmaster, 2004). Research in Russia reports that hyperactivity and attention deficit are noted in 61% of FAS cases, suggesting that alternative classifications are possible and probable. The aetiologies of disabilities, however, are critically important at a policy level as they can determine treatment protocols, and can have an important impact on funding and focus of prevention and treatment activity.

Policy Comparisons and funding considerations

A review of international alcohol policies indicates that several countries have updated policies guidelines that relate to pregnant women within recent years, including Australia (22). There is however, a divergence of policy advice with some countries categorically stating that pregnant women should not drink (Canada, Ireland, France, Netherlands which also includes drinking during preconception and breastfeeding, New Zealand, Spain and the US) and other countries stating that not drinking is the safest option but that one or two drinks per week is considered low risk. The current Australian guidelines for pregnant (and breastfeeding) women adopt the more lenient second option as do the policies from the United Kingdom and Switzerland. This dichotomy of policy shows divergence in interpretation and emphasis of the current (un)available research on low level use of alcohol during pregnancy, that is: 1) there is no safe known level of use leading to strict guidelines of no use; or 2) there is no research/replication of research indicating that low levels of use are unsafe leading to guidelines which note the acceptance of low level use.

The most recent Australian guideline (Guideline 4, March 2009) to reduce risk from drinking alcohol during pregnancy is stated in terms of the potential harm for the developing fetus and breastfeeding infant. The guideline states (National Health and Medical Research Council, 2009):

Maternal alcohol consumption can harm the developing fetus or breastfeeding baby.

A. For women who are pregnant or planning a pregnancy, not drinking is the safest option

B. For women who are breastfeeding, not drinking is the safest option.

The level of risk is:

- highest when there is high, frequent maternal alcohol intake
- likely to be low if a woman has consumed only small amounts of alcohol (such as one or two drinks per week) before she knew she was pregnant or during pregnancy
- more likely to be related to neurodevelopmental abnormalities than prematurity, miscarriage, still birth or reduced birth weight at low levels of maternal alcohol consumption
- individually variable as it is influenced by a wide range of maternal and fetal characteristics

If Australia is to develop effective FASD prevention activity, ongoing up-to-date reporting systems are required to fully understand consumption rates of pregnant women (and the social context that supports it). As noted previously, pregnant women in Australia are approximately four times more likely to drink than pregnant women in the US. The US Dietary Guidelines state that women who are pregnant, or who are planning to become pregnant should never drink (US Department of Agriculture and US Department of Health and Human Services, 2010). Although a reasonably simplistic comparison, Australia's policy makers should perhaps consider this policy difference as it demonstrates that a country with an exclusive abstinence policy approach to alcohol consumption during pregnancy can achieve a relatively lower rate of consumption (12%) than one without (50%) (Substance Abuse and Mental Health Services Administration, 2007), albeit with different levels of per capita alcohol consumption, social context of that consumption, and public health funding and intervention.

Other considerations for policy development

Another issue that needs consideration in policy and public health planning is that of maternal guilt and fear. This issue largely stems from the 'blame' approach which takes women's alcohol use out of the cultural and social context in which it occurs and may result in historical guilt of mothers who have at some time in the past had an alcohol exposed pregnancy, whether inside or outside past policy guidelines, which impacted on their child (Parker, Maviglia, Lewis, Gossage, & May, 2010; Russell, 2011), or possible terminations by women who have drunk alcohol during early pregnancy when the pregnancy was not yet recognised. Additionally, consideration needs to be given to the possible stigmatization of mothers particularly as the name of the syndrome is directly related to the actions of the mother. Campaigns that raise awareness of risks of alcohol consumption during pregnancy also need to consider the creation of unnecessary anxiety or the 'worried well', particularly given the current dearth of information about low level use during pregnancy.

It is interesting to note that a recent International conference on FAS held a plenary session with mothers of children born with FAS. The presenters unanimously spoke of the need for strong messages for women not to use alcohol while pregnant, that the stigma and shame fall to the background during a life time of supporting a child with FAS (Russell, 2011). These women were from a range of countries and noted the need for early and ongoing intervention to reduce the occurrence and impact of alcohol use during pregnancy. Early formative work with Australian women also indicated that contemporary women want a clear understanding of current research to guide their decisions about alcohol during pregnancy (McBride et al., 2012), and that 'scare tactic' can be effective. Women also overwhelmingly want their health professional to inform them about drinking during pregnancy and FASD, however, research suggests that Australian GP's in particular are hesitant to do so (France et al., 2010) due to the perceived sensitivity of the issue. This reluctance among the health profession to provide appropriate advice (France et al., 2010) and information indicates the need for effective training so that the needs of women and their families are met.

Australia's current policy response to FASD

Australian policy response to FAS was initiated in 2001 in its government National Alcohol Strategy noting that 'educational activities need to target adolescent girls and boys and women of child bearing age to inform them about the risks to the foetus of drinking to intoxication.'(Commonwealth Department of Health and Aged Care, 2001) This was immediately followed by the National Expert Advisory Committee on Alcohol review of the scientific literature on FASD leading to a national workshop in 2002. A policy hiatus occurred during the period between 2002 and 2012 when an inquiry and report by the House of Representatives Standing Committee on Social Policy and Legal Affairs into Fetal Alcohol Spectrum Disorders (House of Representatives Standing Committee on Social Policy and Legal Affairs, 2012) initiated the release in 2013 of the Australian Government Action Plan Responding to the Impact of Fetal Alcohol Spectrum Disorders in Australia (Australian Government, 2013). This 12 page report seeks to action five key areas including: 1) Supporting a whole of government approach to the issue of FASD, given its relevance to a broad range of services and supports across portfolios; 2) Taking a whole of population approach to the issue, whilst noting that targeted approaches to prevention and management should be pursued for populations at greatest risk from FASD; 3) Recognising the preventable nature of FASD and support continuation of efforts to prevent FASD building upon existing government program activity; 4) Supporting access by children and families impacted by FASD to services based on need and level of functional impairment; and 5) Supporting the health and broader workforce to prevent FASD and to better respond to the needs of families impacted by it. There is no doubt that this is a socially complex problem and approaches to prevention will need to be developed, evaluated, and evolve to ensure that policy and intervention achieve optimal outcomes, are continually reviewed to ensure an evidence-basis, and are assessed to ensure behavioural impact. Australia has taken initial steps in this direction.

Community health costs of FASD.

From a community perspective the fiscal costs associated with dealing with FAS as identified in the USA context are US\$2.9 million per case per lifetime, or an annual cost of US\$3.6 billion (mean adjusted costs) making FAS one of the most expensive birth defects for the community to treat (Lupton, Burd, & Harwood, 2004; Olsen et al., 2009). Olsen and

colleagues in their US National Task Force Report on FAS and FASD, note that if FASD was included in these costs, then costs would be much higher (Olsen et al., 2009). Calculating accurate economic costs for Australia will be an essential part of any future focus on FASD. Included in these costs but often hidden from discussions about FASD is the likelihood of FASD effected children and adults being overrepresented in the criminal justice system an issue that has only just started to be addressed in Australia (Douglas, 2009) with some estimates suggesting that up to 60% of those effected by FASD enter the legal system (Fitzgerald, 2012).

Conclusion

With some exceptions, the history of Australian women's alcohol use, and therefore the potential for alcohol exposed pregnancies, is relatively recent, starting around the late 1960's and increasing to current times. This fifty year period of potential, and probable alcohol affected pregnancies will have resulted in an increasing prevalence of FASD, leading to current patterns where one in every two births have some level of alcohol exposure and therefore some risk of FASD. In addition to financial impact, FASD represents a loss of potential for individuals, family, and community. FASD's are preventable, so this period of probable effect, represent a period of lost opportunity for public health action to reduce the impact of alcohol use during pregnancy. Australian women are still drinking, often to high risk levels during pregnancy, and part of this is due to conflicting and inadequate information, intervention and public health planning, programming and policy, that not only considers women, but their partners, their families, their friends and Australia's social acceptance of alcohol use generally. FASD can be difficult to diagnose, and in relation to other countries, has only recently been identified as a public health issue in Australia. This may be due to its sensitive aetiology and perhaps also with the potentially high public health prevention costs that would result if the issue was more widely recognised. However, the process has started and Australia now needs to move decisively forward through a high level of multidisciplinary collaboration and commitment between government, health professionals, researchers and effected families and communities, and requires action at multiple levels along with adequate public funding.

References

- Abel, E. (2004). Paternal contribution to fetal alcohol syndrome. *Addiction Biology*, 9, 127-133.
- Australian Government. (2013). *Responding to the impact of Fetal Alcohol Spectrum Disorders in Australia. A Commonwealth action Plan*. Canberra: Commonwealth of Australia.
- Buckmaster, L. (2004). Medication for Attention Deficit/Hyperactivity Disorder (ADHA): An analysis by federal electorate (2001-03). Parliamentary Library of Australia: Canberra.
- Clarren, S. (2005). *A thirty year journey from tragedy to hope. Foreword. In: Buxton: An adoptive mothers discovers the tragic toll of alcohol in pregnancy*. New York: Carroll & Graf.
- Commonwealth Department of Health and Aged Care. (2001). *National Drug Strategy. National Alcohol Strategy, A plan for action 2011 to 2003-04. Australian Government, Canberra*.
- Delaney-Black, V., Covington, C., Templin, T., Ager, J., Nordstrom-Klee, B., Martier, S., . . . Sokol, R. (2000). Teacher-assessed behaviour of children prenatally exposed to cocaine. *Pediatrics*, 106(4), 782-791.
- Douglas, H. (2009). The sentencing response to defendants with fetal alcohol spectrum disorder. *Criminal Law Journal*, 34(4), 221-239.
- Elliott, E., Payne, J., Morris, A., Haan, E., & Bower, C. (2008). Fetal alcohol syndrome: a prospective national surveillance study. *Archives of Disease in Childhood*, 93, 732-737.
- Fitzgerald, J. (2012). Session two. Focus on FASD in WA. Telethon Institute for Child Health Research Seminar.
- France, K, Henley, N, Payne, J, D'Antoine, H, Bartu, A, O'Leary, C, & al, et. (2010). Health professionals addressing alcohol use with pregnant women in Western Australia - barriers and strategies for communication. *Substance Use and Misuse*, 10, 1474-1490.
- Guerri, C. (2002). Mechanisms involved in central nervous system dysfunctions induced by prenatal ethanol exposure. *Neurotoxicity Research*, 4(4), 327-335.
- Guerri, C., Bazinet, A., & Riley, E. (2009). Foetal Alcohol Spectrum Disorders and alteration in brain and behaviour. *Alcohol & Alcoholism*, 44(2), 108-114.
- Hawks, D. (1989). Is it possible to recommend safe drinking levels without increasing per capita consumption? Another aspect of the prevention paradox. *British Journal of Addiction*, 84, 371-375.
- Haycock, P. (2009). Fetal alcohol spectrum disorders: the epigenetic perspective. *Biol Repord*, 81, 607-617.
- Hegedus, A., Alterman, A., & Tarter, R. (1984). Learning achievements in sons of alcoholics. *Alcoholism: Clinical and Experimental Research*, 8, 330-333.
- House of Representatives Standing Committee on Social Policy and Legal Affairs. (2012). *The hidden harm. Inquiry into the prevention, diagnosis and management of Fetal Alcohol Spectrum Disorders*. Canberra: Commonwealth of Australia.
- Jones, K., & Smith, D. (1973). Recognition of the Fetal Alcohol Syndrome in early infancy. *Lancet*, 2, 999-1001.

- Kyskan, C., & Moore, T. (2005). Global perspectives on Fetal Alcohol Syndrome: Assessing practices, policies and campaigns in four English-speaking countries. *Canadian Psychol*, 46(3), 153-165.
- Lemoine P., Harousseau, H., Borteyru, J-P., & Menuet, J-P. (1968). les enfants de parents alcooliques. Anomalies observees. *Aproprs de 127 cas. Quest Med*, 21, 476-482.
- Lupton, C., Burd, L., & Harwood, R. (2004). Cost of fetal alcohol spectrum disorders. *American Journal of Medical Genetics. Part C: Seminars in Medical Genetics*, 127(1), 42-50.
- Majewski, F., Bierich, J., Loeser, H., Michaelis, R., Leiber, B., & Beetecken, F. (1976). Clinical aspects of pathogenesis of alcohol embryopathy. *MMW Munch Med Wochenschr*, 118, 1635-1642.
- May, P., & Gossage, P. (2011). Maternal risk factors for Fetal Alcohol Spectrum disorders: not as simple as it might seem. *Alcohol Research & Health*, 34(1), 15-26.
- May, PA, Fiorention, D, Coridale, G, Kalberg, WO, Hoyme, HE, Aragon, AS, . . . Ceccanti, M. (2011). Prevalence of Children with severe fetal alcohol spectrum disorders in communities near Rome, Italy: new estimated rates are higher than previous estimates. *International Journal of Environmental Research & Public Health*, 8(6), 2331-2351.
- McBride, N., Carruthers, S., & Hutchinson, D. (2012). Reducing Alcohol Use During Pregnancy: Listening to women who drink as a prevention starting point. A formative intervention research study. *Global Health Promotion*, 19(2), 102-114.
- McBride, N., Farrington, F., Muleners, L., & Midford, R. (2006). School Health and Alcohol Harm Reduction Project. Details of intervention development and research procedures. National Drug Research Institute Monograph. Perth, Western Australia.
- National Health and Medical Research Council, . (2009). Australian guidelines to reduce health risk from drinking alcohol. National Health and Medical Research Council: Canberra. ISBN 1864963743.
- O'Leary, C., Zubrick, S., Taylor, C., Dixon, G., & Bower, C. (2009). Prenatal alcohol exposure and language delay in 2-year-old children. The importance of dose and timing of risk. *Pediatrics*, 123, 547-554.
- Olegard, R., Sabel, K., Aronsson, M., Sandin, B., Johannsson, P., Carlsson, C., . . . Hrbek, A. (1979). Effects on the child of alcohol abuse during pregnancy. *Acta paediatrica Scandinavica*, 275, 112-121.
- Olsen, H., Ohlemiller, M., O'Connor, M., Brown, C., Morris, C., & Damus, K. (2009). *A call to action. Advancing essential services and research on Fetal Alcohol Spectrum Disorders. A report of the National Task Force on Fetal Alcohol Syndrome and Fetal Alcohol Effects. National Task Force on Fetal Alcohol Syndrome and Fetal Alcohol Effect Post Exposure Writing Group, March, .*
- Organisation, World Health. (2011). Global Health Report on Alcohol. Geneva, Switzerland: WHO Press.
- Ouko, L., Shantikumar, K., Knezovich, J., Haycock, P., Schnugh, D., & le Ramsay, M. (2009). Effect of alcohol consumption on CpG methylation in the differentially methylated regions of H19 and IG-DMR in male gametes - implications for fetal alcohol spectrum disorders. *Alcoholism: Clinical and Experimental Research*, 33, 1615-1627.

- Parker, T, Maviglia, MA, Lewis, PT, Gossage, JP, & May, PA. (2010). Psychological distress among Plains Indian mothers with children referred to screening for Fetal Alcohol Spectrum Disorders. *Substance Abuse Treatment, Prevention & Policy*, 5(22), UI 20819208.
- Roarty, L., Frances, K., Allsop, S., O'Leary, C., McBride, N., & Wilkes, T. (2013). Alcohol, pregnancy and Fetal Alcohol Spectrum Disorders Resources for health professionals working with Aboriginal and Torres Strait Islander health care settings. Final Report. National Drug Research Institute: Perth, Australia.
- Russell, E. (2011). The power of knowledge: Reflections from the experiences of birth mothers. Reflections of a birth mother. In: 4th International Conference on Fetal Alcohol Disorder Syllabus. The University of British Columbia: Vancouver. 2011.
- Stade, B., Dailey, C., Dzenoletas, D., Sgro, M., Dowswell, T., & Bennett, D. . (2009). Psychological and/or educational interventions for reducing alcohol consumption in pregnant women and women planning pregnancy. *Cochrane Database of Systematic Reviews 2009; Issue 2. Art. No.: CD004228. DOI: 1002/14651858.CD004228.PUB2.*
- Streissguth, A., Barr, H., Kogan, J., & Bookstein, F. (1996). *Understanding the occurrence of secondary disabilities in clients with Fetal Alcohol Syndrome (FAS) and Fetal Alcohol Effects (FAE): Final report to the Centers for disease Control and Prevention on Grant no. R04/CCR008515 (Tech. Report no. 96-06)*. Seattle, University of Washington, Fetal Alcohol and Drug Unit.
- Streissguth, A., Bookstein, F., Barr, H., Sampson, P., O'Malley, K., & Young, J. (2004). Risk factors for adverse life outcomes for fetal alcohol syndrome and fetal alcohol effects. *Journal of Developmental & Behavioral Pediatrics*, 25(4), 228-238.
- Substance Abuse and Mental Health Services Administration, . (2007). Results from the 2006 National Household Survey on Drug Abuse and Health: National Findings. Office of Applied Studies, NSHUH Series H-32, DHHS Publication No. SMA 07-4293: Rockville, MD.
- Sullivan, W. (1899). A note on the influence of maternal inebriety on the offspring. *Journal of Mental Science*, 45, 489-503.
- Thomas, J. (2011). *Epigenetics and FASD Choline as a treatment for FASD: choline as an epigenetic factor*. Paper presented at the 4th International Conference on Fetal Alcohol Spectrum Disorder Vancouver.
- Ulleland, C. (1972). The offspring of alcoholic mothers. *Annals New York Academy of Science*, 197, 167-169.
- US Department of Agriculture and US Department of Health and Human Services. (2010). Dietary Guidelines for Americans 2010. 7th Edition, Washington, DC: US Government Printing Offices.
- US Department of Health and Human Services. (2007). Fetal alcohol spectrum disorders among Native Americans. <http://store.samhsa.gov/product/SMA06-4245>
- World Health Organisation, . (1999). Global status report on alcohol. World Health Organisation: Geneva.