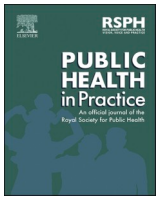
Public Health in Practice 8 (2024) 100559

Contents lists available at ScienceDirect

Public Health in Practice

journal homepage: www.sciencedirect.com/journal/public-health-in-practice



Born into homelessness: A retrospective observational study

C. Leahy [a], C.A. Murphy [a], R. Cullen [b], P. Foster [a], F.D. Malone [a,b], N. McCallion [a,b], K. Cunningham [a,c,*]

[a] Rotunda Hospital, Dublin, Ireland
[b] Royal College of Surgeons Ireland, Dublin, Ireland
[c] Children's Health Ireland at Temple St, Dublin, Ireland

ARTICLE INFO

Keywords:
Homelessness
Health Equity
Neonatology
Obstetrics

ABSTRACT

Objective: To evaluate the differences in the antenatal and neonatal courses of maternal-infant dyads within a homeless population as compared to the general hospital population.
Design: This was a retrospective observational study.
Setting: A large single tertiary maternity hospital (8500 deliveries/year) in Ireland.
Patients: We retrospectively reviewed perinatal outcomes for homeless women who delivered liveborn infants at a tertiary maternity hospital, during the calendar year 2020. Homelessness was defined as either A) A designated homeless accommodation service listed as the home address; or B) Self-identified as homeless with an address other than homeless accommodation. We then compared the study cohort with the general hospital population who delivered liveborn infants in the year 2020.
Outcome measure: A set of key clinical variables (maternal, antenatal, birth and postnatal outcomes) were obtained and descriptive statistics were performed and compared to available hospital wide data.
Results: A total population of 145 infants born to 143 homeless mothers were included. Compared with the general hospital population, infants born into homelessness were more likely to be born preterm (15 % vs 7 %), with lower median birth weight (3.1 kg vs 3.4 kg) and higher rates of admission to the neonatal unit (35 % vs 14 %). Following discharge, there was a greater incidence of missed appointments to the neonatal clinic (29 % vs 8 %), and lower rates of exclusive breastfeeding (16 % vs 45 %).
Conclusions: Addressing societal inequalities starts before birth. Infants born into homelessness are particularly vulnerable to perinatal factors associated with negative long-term outcomes when compared with the general population.

1. Introduction

Homelessness and the wider issue of housing insecurity has received increasing attention over the past decade globally. In Ireland, out of a population of 5 million people, recent data from January 2022 indicated 9150 people (including 2563 children) [1] are in need of emergency/-homeless accommodation which further increased to 14,303 people (including 4404 children) in June 2024. This is more than double the number of individuals reported as homeless in this state in 2011. However, the true incidence of homelessness is likely underestimated. Firstly, the homeless population is rarely static, with individuals and families continuously entering and exiting the homeless accommodation sector. Secondly, many do not come to the attention of state services and therefore are not recorded in official reports.

Women are increasingly represented among young homeless people [2]. Homeless women and their newborns often suffer from a complex intersection of multiple social determinants of health including poverty, domestic abuse, language and cultural barriers. Anecdotal reports by Irish homeless agencies reporting on women in homelessness describe risks and dangers experienced by homeless mothers during their pregnancies, including violence and relationship breakdown, which contribute to loss of living accommodation [3]. Studies from the US and Canada indicate that perinatal housing insecurity is associated with increased rates of low birth weight and prematurity [4–6]. Studies examining homelessness in childhood report lower rates of immunisation [7], greater incidence of health problems [8], and subsequent reduced housing stability in adulthood [9].

To date, few studies report on antenatal course and associated

* Corresponding author. Rotunda Hospital, Dublin, Ireland.
E-mail address: katie.cunningham@childrenshealthireland.ie (K. Cunningham).

https://doi.org/10.1016/j.puhip.2024.100559
Received 6 February 2024; Received in revised form 11 September 2024; Accepted 12 September 2024
Available online 30 November 2024

postnatal outcomes for infants born to homeless mothers. The aim of our study was to examine perinatal outcomes associated with homelessness by comparing a cohort of homeless mother-infant dyads with the general population of mothers and infants attending our tertiary maternity hospital.

2. Methods

We performed a retrospective study of homeless women and their infants born at a tertiary maternity hospital, located in Dublin, Ireland (approximately 8500 deliveries/year). This study was approved by the local research and ethics committee (RAG-2021-006). The catchment area for this hospital includes some of the most socio-economically deprived areas of Ireland. All mothers who attend our maternity hospital and identify as homeless are referred to our Medical Social Work (MSW) department. Pregnant women who engaged with MSW due to homelessness in the calendar year 2020 were eligible for inclusion in this study. Homelessness was defined as either A) a designated homeless centre was listed as their address, or B) self-identified as homeless with an address other than a homeless centre (e.g. 'couch surfing', living with friends or family members, sleeping in cars).

Cases were identified from MSW department records. Pseudo anonymised data was obtained from electronic medical records of included mother-infant dyads. Prenatal factors of interest included maternal demographics, history of smoking, illicit substance use, and medical diagnoses such as diabetes and preeclampsia. Birth history and neonatal outcomes including birth gestation, birth weight, APGAR score, admission to the neonatal unit, feeding outcomes and attendances to the outpatient department were also recorded. Outcomes from the homeless maternal-infant dyads were compared to the general hospital maternal-infant dyad population.

Descriptive statistics were generated. Continuous data were assessed for normality using the Shapiro-Wilk test and histogram representation of the data. Means (standard deviations) are described for normally distributed data, and medians (interquartile range ([IQR]) are described for non-parametric data. For categorical data, proportions (%) are described. Two group analyses were conducted using the student t-test, the Mann Whitney *U* test, or Chi square test as appropriate. Statistical significance was achieved with a p value < 0.05. Statistical analysis was performed using Stata SE Version 17.0.

3. Results

From MSW records, we identified 143 homeless mothers from whom 145 babies were delivered. 110 mothers listed a designated homeless centre as their address, with 33 mothers self-identifying as homeless.

3.1. Maternal outcomes

Homeless mothers were on average 5 years younger than the general population. They were more likely to smoke, report substance misuse, or require treatment for pre-eclampsia (Table 1).

The median (IQR) estimated gestational age at which homeless mothers attended for their booking visit was 13 weeks (12–17). Of these, 62 % of homeless mothers' dating scan were performed prior to 15 weeks gestation, compared with 83 % of the general population. At their booking visit, 99 % of homeless mothers underwent serology testing for blood and sexually transmitted bacterial and viral infections, with 16 (11 %) returning a positive result. This compares with 2 % of the overall population of mothers attending our maternity hospital in 2020. 48 % had at least one documented instance of failing to attend a scheduled appointment antenatally. A fetal anatomy scan (offered to all women attending this hospital and typically performed at 20–22 weeks gestation) was completed for 87 % of homeless mothers. Congenital anomalies were detected prenatally for 7 infants, and a further 2 infants were identified postnatally. Of homeless mothers, 57 % were referred to Perinatal Mental Health services. At the time of delivery, homeless mothers were more likely to labour spontaneously, and less likely to deliver by caesarean section compared with the general population (Table 2).

Table 1
Maternal demographics of women in the homeless cohort and the general hospital population in 2020.

	Homeless Cohort	General Population	*p* Value
Mothers	n = 143	n = 8109	
Maternal Age (years), mean, SD	26.7 (±6.3)	31.5 (±5.7)	<0.01
Parity, median IQR	1 (0–2)	1 (0–1)	<0.01
Cigarette smoking, n (%)	51 (36)	776 (10)	<0.01
Substance misuse, n (%)	34 (24)	64 (0.8)	<0.01
GDM on Insulin, n (%)	7 (5)	241 (3)	0.18
PET on Treatment, n (%)	10 (7)	209 (3)	<0.01
APH requiring Admission, n (%)	6 (4)	235 (3)	0.35

SD, standard deviation; IQR, interquartile range; GDM, gestational diabetes; PET, pre-eclampsia; APH, antepartum haemorrhage.

3.2. Neonatal outcomes

A total of 141 singletons and two pairs of twin liveborn infants were delivered to homeless mothers in our cohort. The incidence of prematurity (birth prior to 37 weeks gestation) for infants born into homelessness was double that for the general population (21 (15 %) v 586 (7 %), p < 01). Homeless infants were smaller (3.1(±0.7) kg v 3.4(±0.6) kg, $p < 0.01$), and more likely to be admitted to the neonatal unit (51 (35 %) v 1181 (14 %), $p < 0.01$) (Table 3). An Apgar score of <7 at 5 min was recorded for 7 (5 %) homeless newborns. Birth weight <10th centile occurred in 18 (12 %), and birth occipitofrontal circumference was <10th centile in 22 (15 %) infants.

In 2020, there were 1181 admissions to our neonatal intensive care unit (NICU), including 51 homeless newborns. The three most common indications for homeless newborns to be admitted to our NICU were respiratory morbidities, Neonatal Abstinence Syndrome (NAS), and prematurity. Some newborns experienced associated comorbidities. When comorbidities are included, NAS occurred in 17 (33 %) of homeless babies requiring admission to NICU. In comparison, the most common indications for admission to our NICU in 2020 overall were jaundice, prematurity and respiratory morbidities, respectively, with NAS ranking 7th. Overall, NAS accounted for 24 (2 %) admissions to NICU in 2020, contributing to 513 bed days that year.

3.3. Post-discharge

Method of feeding post discharge differed between homeless and general populations. Rates of exclusive breastfeeding were lower for

Table 2
Labour and delivery demographics of infants in the homeless cohort and the general hospital population in 2020.

	Homeless Cohort	General Population	*p* Value
Infant	n = 145	n = 8287	
Labour			
Spontaneous Labour, n (%)	71 (49)	3198 (39)	0.01
Induction of Labour, n (%)	52 (36)	3039 (37)	
Pre-Labour, n (%)	22 (15)	2049 (25)	
Delivery			
Spontaneous Vaginal Delivery, n (%)	86 (59)	3815 (46)	<0.01
Operative Vaginal Delivery, n (%)	17 (12)	1315 (16)	
Caesarian Section, n (%)	42 (29)	3155 (38)	

Table 3
Neonatal Demographics of infants in the homeless cohort and the general hospital population in 2020.

	Homeless Cohort	General Population	*P* Value
Infants	n = 145	n = 8287	
Birth Weight (kg): Mean (SD)	3.1 (±0.7)	3.4 (±0.6)	<0.01
Preterm, n (%)	21 (15)	586 (7)	<0.01
NICU Admission, n (%)	51 (35)	1181 (14)	<0.01

SD, standard deviation.

homeless infants (23 (16 %) vs 45 %), with greater incidence of formula feeding (92 (63 %) vs 36 %). Combination of breast and formula feeding was similar (28 (19 %) vs 18 %). Of those referred for neonatal outpatient follow-up, we observed a greater incidence of missed appointments for homeless infants compared with the general population (26 (29 %) v 8 %).

4. Discussion

This study assessed clinical differences in pre- and post-natal outcomes between the homeless mothers and the general population of mothers delivering at our tertiary maternity centre. This study was performed at a time when many developed nations are experiencing significant strain on housing supply with widespread resulting social challenges.

We observed significant clinical differences between homeless mothers and the general population, some of which can impact on neonatal outcomes. The average homeless pregnant patient was more likely to have positive serology, actively smoke, and engage in substance abuse. As a result of their complex social challenges, almost half were recorded as having missed appointments, over one third did not have a dating scan prior to 15 weeks, and in 12 % no anomaly scan was performed prior to delivery. This suggests poor engagement with hospital services. Such impacts on prenatal care increase the risk of adverse neonatal outcomes. Poor attendance and links with healthcare services are almost certainly multifactorial. Difficulty in communicating appointments to mothers due to a lack of permanent addresses or reliable phone service, the unpredictability of their daily lives, and language/cultural barriers all likely play a role.

It could be argued that the younger age profile of homeless mothers could offer some protection against the complications of pregnancy. We observed a higher rate of spontaneous onset of labour and spontaneous vaginal delivery, with lower incidence of delivery by caesarean section. However, poor engagement with health services prenatally may have resulted in women who would have been identified as candidates for caesarean sections not being done so. In addition, their younger age may be associated with a reduced likelihood of stable familial or relationship structures. Furthermore, their higher parity may reflect barriers in accessing medical care such as contraception along with the well documented issue of unequal power dynamics and sexual violence facing homeless women [10].

The association between homelessness and the higher incidence of pre-eclampsia is unclear although it has been previously demonstrated in a 2007–2012 retrospective Californian study [11]. General poor engagement with healthcare services and chronic stressors associated with societal inequities may play a role. In addition, post-traumatic stress disorder (PTSD) has been identified as a risk factor for pre-eclampsia. A study from 2011 identified significantly elevated rates of PTSD amongst homeless pregnant women [12]. The high rate of mental health referrals in our cohort may support this link. While weight was not evaluated in this study, a 2013 study found elevated rates of obesity in homeless adults [13] and obesity is a well-known risk factor for pre-eclampsia.

The high incidence of NICU admissions is a significant finding of this review. In keeping with prior studies [14] we observed higher rates of prematurity and low birth weight in this cohort of homeless infants. The higher incidence of preterm birth is likely multifactorial. Homeless women possess a complex confluence of risk factors including low socio-economic status, low education level, poor nutritional status, smoking and substance abuse. The differences seen in birth weight may also relate to the increased incidence in prematurity, pre-eclampsia, and maternal smoking. NAS was also disproportionate in infants born into homelessness. These infants account for a significant number of hospital bed days. Maternal substance misuse, as well as some concomitant prescribed psychiatric medications, would account for those experiencing NAS.

This study does not assess long-term outcomes, however prematurity, intra-uterine growth restriction, low birth weight, and exposure to maternal toxins in utero are all recognised causes of neurodevelopmental delay. How to mitigate for these could include addressing housing security, maternal engagement with addiction services, and a dedicated homeless liaison service, with improved prenatal attendance to appointments. Dedicated allocation of hospital resources and provision of homeless liaison services should take into account the very high cost both financially and in terms of a scarce resource, which a NICU admission poses to the hospital, and subsequent long-term outcomes for infants born into homelessness. Additionally previous research has documented increased hospital admissions and worse general health, in particular asthma, amongst children who were born premature, even when only moderately so [15,16], along with increased all-cause mortality in early adulthood with particular association with cardiovascular and respiratory causes [17]. Any measures that reduce such outcomes may well prove financially sound.

The observed feeding rates at discharge are concerning for several reasons. Given the known benefits of breastfeeding including reduced acute infections amongst infants [18] along with lower rates of certain chronic conditions [19], interventions to support breast feeding could achieve substantial health improvements for both mother and infant. The corollary of this is that safe provision of formula feeding requires financial support, a reliable supply of sterile water and the means to clean and sterilise bottles properly. Depending on their circumstances, access to such facilities may be limited. Such issues can be exacerbated by poor engagement with healthcare as demonstrated by the higher rate of non-attendance at hospital appointments as demonstrated in the study. Additional factors impacting on breastfeeding includes those discharged to foster care, and where breast feeding is contraindicated in mothers with certain infections.

Homelessness is of growing concern. While a casual observer might have predicted the above findings from a homeless cohort of mothers, our data clearly demonstrates the adverse outcomes associated between pre and postnatal outcomes. The increased incidence of adverse outcomes in this cohort (particularly preterm birth and NICU admissions) of homeless mother-infant dyads has some similarities to the findings of a previous study of another vulnerable group, international protection applicants, at our institution [20]. However, the homeless cohort has unique needs specifically, high rates of substance abuse, cigarette smoking and mental illness, and may be a more difficult group to identify and engage with.

Healthcare workers should be aware they are engaging with a highly vulnerable population, and adapt management plans and recommendations according to the unique social circumstances of the families they encounter. On a wider level, decisions on provision of services, both at a hospital and a national public health level, should consider when allocating resources that 'homelessness is expensive' as documented in wider social science research [21]. Interventions performed early have the potential to prove cost effective as well as to reduce the incidence of adverse outcomes for the infants involved, while also freeing up scarce NICU resources. Examples of these interventions could range from those applicable at a hospital level-e.g. allocation of dedicated homeless liaison staff or clinics, which could include specific paediatric follow up, to government macro-policy such as prioritisation of, and investment in,

secure housing for pregnant homeless people.

This study is limited by its size and retrospective nature. As a retrospective review it is subject to the well-known issues of bias which this study design can pose. We examined a portion of the homeless population in this state, which may have been skewed towards the worse off given the selection criteria. For instance, women who may have been homeless for some or all of their pregnancy but did not disclose this fact were not included in our sample.

For some variables, there was no hospital wide data available for comparison. Therefore while experienced clinicians can certainly interpret them in light of well-known norms and their own experience, they cannot be fully compared and a statistically significant relationship cannot be established. It is also possible that some of the discrepancy in outcomes is not due purely to the independent risk factor of homelessness but to a third variable correlated with it e.g. substance abuse. These questions would likely represent a fruitful focus for future research, as would a study which assessed benefits of various forms of intervention such as those mentioned above to guide future policy. Furthermore, national data examining outcomes for both mothers and their infants who are born into homelessness is urgently required, which would further assist in identifying key interventions and supports necessary for this population.

5. Conclusion

Infants born into homelessness are an exceptionally vulnerable group, in which a cascading series of risk factors contributes to adverse outcomes. Addressing societal inequalities needs to start before birth, so as to avoid adverse outcomes for the infants involved.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

[1] June 2024 Monthly Homelessness Report. Department of Housing, Local Government and Heritage. Ireland.

[2] Busch-Geertsema, Volker, Hrast et al. Extent and Profile of Homelessness in European Member States EOH Compar0061tival Studies on Homelessness A Statistical Update EOH Comparative Studies No 4.

[3] P. Mayock, S. Parker, S. Sheridan, Women homelessness and service provision, Simon Commun, Ireland, 2015, p. 17.

[4] K.M. Leifheit, G.L. Schwartz, C.E. Pollack, K.J. Edin, M.M. Black, J.M. Jennings, K. N. Althoff, Severe housing insecurity during pregnancy: association with adverse birth and infant outcomes, Int. J. Environ. Res. Publ. Health 17 (2020) 8659, https://doi.org/10.3390/ijerph17228659.

[5] M. Sandel, R. Sheward, S. Ettinger de Cuba, S. Coleman, T. Heeren, M.M. Black, P. H. Casey, M. Chilton, J. Cook, D.B. Cutts, R. Rose-Jacobs, D.A. Frank, Timing and duration of pre- and postnatal homelessness and the health of young children, Pediatrics 142 (4) (2018 Oct) e20174254, https://doi.org/10.1542/peds.2017-4254. Epub 2018 Sep 3. PMID: 30177513.

[6] D.B. Cutts, S. Coleman, M.M. Black, M.M. Chilton, J.T. Cook, S.E. de Cuba, T. C. Heeren, A. Meyers, M. Sandel, P.H. Casey, D.A. Frank, Homelessness during pregnancy: a unique, time-dependent risk factor of birth outcomes, Matern. Child Health J. 19 (6) (2015 Jun) 1276–1283, https://doi.org/10.1007/s10995-014-1633-6. PMID: 25404405.

[7] L.Y. Fu, R. Torres, S. Caleb, Y.I. Cheng, E. Gennaro, E. Thoburn, J. McLaughlin, R. Alexander-Parrish, J. Wang, Vaccination coverage among young homeless children compared to US national immunization survey data, Vaccine 39 (45) (2021 Oct 29) 6637–6643, https://doi.org/10.1016/j.vaccine.2021.09.073. Epub 2021 Oct 8. PMID: 34629209.

[8] J.J. Cutuli, et al., Adversity and children experiencing family homelessness: implications for health, J. Child. Poverty 23 (1) (2017) 41–55.

[9] M. Parpouchi, A. Moniruzzaman, J.M. Somers, The association between experiencing homelessness in childhood or youth and adult housing stability in Housing First, BMC Psychiatr. 21 (2021) 138, https://doi.org/10.1186/s12888-021-03142-0.

[10] E. Corey, S. Frazin, S. Heywood, S. Haider, Desire for and barriers to obtaining effective contraception among women experiencing homelessness, Contra. Reprod Med. 5 (2020 Aug 17) 12, https://doi.org/10.1186/s40834-020-00113-w. PMID: 32821424; PMCID: PMC7429881.

[11] M.S. Pantell, R.J. Baer, J. Torres, et al., Associations between unstable housing, obstetric outcomes, and perinatal health care utilization, Am. J. Obstet.Gynecol MFM 1 (2019) 100053.

[12] D.M. Crawford, E.C. Trotter, K.J. Hartshorn, L.B. Whitbeck, Pregnancy and mental health of young homeless women, Am. J. Orthopsychiatry 81 (2) (2011 Apr) 173–183, https://doi.org/10.1111/j.1939-0025.2011.01086.x. PMID: 21486259; PMCID: PMC3383651.

[13] J. Tsai, R.A. Rosenheck, Obesity among chronically homeless adults: is it a problem? Publ. Health Rep. 128 (1) (2013 Jan-Feb) 29–36, https://doi.org/10.1177/003335491312800105. PMID: 23277657; PMCID: PMC3514718.

[14] K.M. Leifheit, G.L. Schwartz, C.E. Pollack, K.J. Edin, M.M. Black, J.M. Jennings, K. N. Althoff, Severe housing insecurity during pregnancy: association with adverse birth and infant outcomes, Int. J. Environ. Res. Publ. Health 17 (2020) 8659, https://doi.org/10.3390/ijerph17228659.

[15] E.M. Boyle, G. Poulsen, D.J. Field, J.J. Kurinczuk, D. Wolke, Z. Alfirevic, M. A. Quigley, Effects of gestational age at birth on health outcomes at 3 and 5 years of age: population based cohort study, BMJ 344 (2012 Mar 1) e896, https://doi.org/10.1136/bmj.e896. PMID: 22381676; PMCID: PMC3291750.

[16] R.E. Stein, M.J. Siegel, L.J. Bauman, Are children of moderately low birth weight at increased risk for poor health? A new look at an old question, Pediatrics 118 (1) (2006 Jul) 217–223, https://doi.org/10.1542/peds.2005-2836. PMID: 16818568.

[17] C. Crump, Preterm birth and mortality in adulthood: a systematic review, J. Perinatol. 40 (6) (2020 Jun) 833–843, https://doi.org/10.1038/s41372-019-0563-y. Epub 2019 Nov 25. PMID: 31767981; PMCID: PMC7246174.

[18] J.M. Paricio Talayero, M. Lizán-García, A. Otero Puime, M.J. Benlloch Muncharaz, B. Beseler Soto, M. Sánchez-Palomares, L. Santos Serrano, L.L. Rivera, Full breastfeeding and hospitalization as a result of infections in the first year of life, Pediatrics 118 (1) (2006 Jul) e92–e99, https://doi.org/10.1542/peds.2005-1629. PMID: 16818542.

[19] J.Y. Meek, L. Noble, Section on breastfeeding. Policy statement: breastfeeding and the use of human milk, Pediatrics 150 (1) (2022 Jul 1) e2022057988, https://doi.org/10.1542/peds.2022-057988. PMID: 35921640.

[20] C. Murphy, E. Loftus, F. Malone, N. McCallion, Born into direct provision: outcomes of infants born to asylum seekers, Ir. Med. J. 113 (10) (2020) 206.

[21] S. Pomeroy, The Cost of Homelessness: Analysis of Alternate Responses in Four Canadian Cities, 2005.