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Maternal disability and newborn discharge to social services: a population-based study

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Abstract

Introduction

Removing a child from their family is the option of last resort for social services. However, decisions to place children into care are occurring more frequently and earlier in children's lives, with newborn discharge to social services being a particular concern due to the effects of mother-newborn separations on child development. Women with disabilities face negative assumptions about their parenting capacity, but little is known about their rates of newborn discharge to social services.

Objectives

To examine the risk of discharge to social services among newborns of women with and without disabilities.

Methods

We conducted a population-based cohort study of singleton livebirths in Ontario, Canada, 2008-2019. We used modified Poisson regression to estimate the relative risk (RR) of discharge to social services immediately after the birth hospital stay, comparing newborns of women with physical ($n = 114,685$), sensory ($n = 38,268$), intellectual/developmental ($n = 2,094$), and multiple disabilities ($n = 8,075$) to newborns of women without a disability ($n = 1,221,765$). Within each group, we also examined maternal sociodemographic, health, health care, and pregnancy-related characteristics associated with the outcome.

Results

Compared to newborns of women without disabilities (0.2%), newborns of women with physical (0.5%; aRR 1.53, 95% CI 1.39–1.69), sensory (0.4%; aRR 1.34, 95% CI 1.12–1.59), intellectual/developmental (5.6%; aRR 5.34, 95% CI 4.36–6.53), and multiple disabilities (1.7%; aRR 3.09, 95% CI 2.56–3.72) had increased risk of being discharged to social services after the birth hospital stay. Within each group, the strongest predictors of the outcome were young maternal age, low income quintile, social assistance, maternal mental illness and substance use disorders, inadequate prenatal care, and neonatal morbidity.

Conclusions

Newborns of women with disabilities are at increased risk of being discharged to social services after the birth hospital stay. These findings can be used to inform the development of tailored supports for new mothers with disabilities and their infants.

Keywords

disability; social care; infant health; population-based cohorts

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Introduction

One in five adults have a disability [1]. Historically, people with disabilities have been subject to discrimination and exclusion, including institutional segregation and involuntary sterilization [2]. In recent decades, pregnancy rates in women with disabilities have risen, with population-based studies reporting one in eight pregnancies are to women with a physical, sensory, or intellectual/developmental disability [3]. Many structural, social, and health-related barriers remain for mothers with disabilities [1, 4, 5]. Women with disabilities face negative societal attitudes about sexuality, pregnancy, and parenting [6]. Health and social service-providers consider an unborn baby to be more at risk if their mother has a disability [7]. Women with intellectual/developmental disabilities in particular are over-represented in child protection cases internationally [8–10], and are more likely to have their children placed in out-of-home care than other mothers [11]. Women with other types of disabilities, including physical and sensory disabilities, also describe being fearful of judgement by professionals in relation to their parenting [12], often without clear evidence or opportunity to demonstrate their abilities [13].

Whilst removing a child from their family is the option of last resort for social services, decisions to place children into care are happening more frequently and earlier in children's lives [13, 14]. Newborn discharge to social services is of particular concern, as mother-infant separation has well-documented negative consequences for children's emotional, social, and physical development [15], via impacts on attachment, bonding, and breastfeeding [16]. Such intervention is also traumatic for mothers and likely to worsen their own health and perceived parenting competency [17–19]. Without support, women are at risk of being caught in a cycle of recurrent involvement with children's social services, and having more than one child removed from their care across their lifetime [20].

In our prior analyses of administrative health data in Ontario, Canada (2002–2012), women with intellectual/developmental disabilities were eight times more likely than women without these disabilities to have their newborn discharged into social services, even after adjusting for other factors [21]. Yet, little is known about the rates at which

women with other disabilities have newborns removed from their care and for how long they are separated, instances of multiple separations in families with more than one child, or predictors of these outcomes. Therefore, we extended our prior research and examined the risk of newborn discharge to social services among women with physical, sensory, intellectual/developmental, and multiple disabilities compared to women with no disability using an updated cohort (2008–2019). As secondary objectives, we (1) examined the risk of sustained separations at 12 months, (2) compared the risk of having multiple separations within one family, and (3) in each disability group, identified risk factors that predict newborn discharge to social services.

Methods

Study design

This was a population-based cohort study in Ontario, Canada using linked administrative health and demographic data. We accessed and analyzed health records at ICES (formerly the Institute for Clinical Evaluative Sciences), which houses information on all Ontario residents (population: 14.6 million; births per year: 140,000). Information was obtained on health services contact and socio-demographics (Table 1) and linked using a unique encoded identifier.

Study population

The cohort included singleton livebirths conceived between April 1, 2008, and March 31, 2019 and delivered in Ontario hospitals. We excluded non-Ontario residents and those with missing data on neighbourhood income quintile and rurality (Supplementary Appendix 1).

Diagnostic algorithms developed in consultation with clinicians and researchers with expertise in disability were applied to health care encounters to identify maternal disability, as in prior research in Ontario and elsewhere [22–24] (Supplementary Appendix 2). We considered a mother to have a disability if she had a relevant diagnosis in ≥ 2 outpatient physician visits or any emergency department visit or hospitalization before conception. Women with congenital anomalies, musculoskeletal disorders, neurologic disorders,

Table 1: Data source information

Data source	Description
Canadian Institutes of Health Information Discharge Abstract Database	Diagnoses from hospital admissions, coded using the International Classification of Diseases and Related Health Problems
National Ambulatory Care Reporting System	Diagnoses from emergency department visits, coded using the International Classification of Diseases and Related Health Problems
Ontario Health Insurance Plan database	Outpatient physician billing claims
Ontario Mental Health Reporting System	Diagnoses from hospital admissions in facilities with designated mental health beds, coded using the Diagnostic and Statistical Manual of Mental Disorders
Registered Persons Database	Dates of birth, dates of death, and residential postal code, linked with Census information

and permanent injuries were considered to have physical disabilities; those with hearing and vision loss were considered to have sensory disabilities; those with autism spectrum disorder, chromosomal anomalies resulting in intellectual disability, fetal alcohol spectrum disorder, or other intellectual disability were considered to have intellectual/developmental disabilities; and women with diagnoses in ≥ 2 of these categories were considered to have multiple disabilities. Women without any recorded disabilities were the referent group.

Outcomes

The main outcome was newborn discharge to social services immediately after the birth hospital stay, defined based on (a) the discharge disposition being listed as “social services”, (b) the newborn being transferred from hospital to the Children’s Aid Society, or (c) the presence of diagnostic code Z62.2 (“institutional upbringing”) in the newborn health record [15]. As secondary outcomes: (1) we identified prolonged maternal-newborn separations using discordant residential postal codes at 12 months as a proxy, and (2) among women with at least two livebirths during the study period, we identified those with multiple newborns discharged to social services immediately after the birth hospital stay across the study period.

Covariates

We measured maternal sociodemographic characteristics: age, parity, neighbourhood income quintile, social assistance receipt [25], and rurality. Maternal health was described using stable and unstable chronic conditions (Johns Hopkins Adjusted Clinical Groups System v. 10.0) [26], mental illness, and substance use disorders, each measured in the 2 years before pregnancy. We measured health care using the Revised Graduated Prenatal Care Utilization Index [27], which categorizes prenatal care adequacy based on the timing and number of visits. Finally, we measured several pregnancy characteristics: severe maternal morbidity [28], preterm birth, and severe neonatal morbidity [29]. Full definitions are included in Supplementary Appendix 3.

Statistical analyses

We compared the characteristics of newborns of women with and without disabilities using frequencies, percentages, and standardized differences [30].

We estimated the relative risk (RR) and 95% confidence interval (CI) of discharge to social services, comparing newborns of women with physical, sensory, intellectual/developmental, and multiple disabilities to those without disabilities, using modified Poisson regression [31] with generalized estimating equations to adjust for clustering of siblings within mothers [32]. We generated crude RRs and RRs adjusted for maternal sociodemographic and health characteristics. Health care and pregnancy characteristics were considered pathway variables and were added to the models in a second step to evaluate their impact on the outcome.

In additional analyses, we used modified Poisson regression to examine the risk of sustained maternal-newborn separation at 12 months. We used multinomial logistic regression to

examine the odds ratios (OR) of ≥ 2 and 1, vs. no instances of newborn discharge to social services among women with multiple livebirths during the study period. Finally, within each of the five groups, we used modified Poisson regression to estimate the RR and 95% CI of each predictor variable on newborn discharge to social services. These were: maternal age, parity, neighbourhood income quintile, social assistance receipt, rurality, stable and unstable chronic conditions, mental illness, and substance use disorder; prenatal care adequacy; severe maternal morbidity; preterm birth; and severe neonatal morbidity.

Analyses used SAS v. 9.4 (SAS Institute Inc., Cary, NC).

Results

From 2008–2019, there were 114,685 births to women with physical, 38,268 to women with sensory, 2,094 to women with intellectual/developmental, 8,075 to women with multiple disabilities, and 1,221,765 to women without a disability. Women with sensory, intellectual/developmental, and multiple disabilities were younger than those without disabilities. Women with intellectual/developmental disabilities were more likely to live in neighbourhoods in the two lowest quintiles, and all disability groups were more likely to receive social assistance. Women with physical and multiple disabilities were more likely to live in rural areas. Women with multiple disabilities were more likely to have stable chronic conditions; all disability groups were more likely to have unstable chronic conditions and mental illness; and those with physical, intellectual/developmental, and multiple disabilities were more likely to have a substance use disorder. Finally, women with multiple disabilities were more likely to experience severe maternal morbidity, and newborns of women with intellectual/developmental and multiple disabilities were more likely to be preterm and experience severe neonatal morbidity (Table 2).

Compared to newborns of women without disabilities (0.2%), newborns of women with physical (0.5%; aRR 1.53, 95% CI 1.39–1.69), sensory (0.4%; aRR 1.34, 95% CI 1.12–1.59), intellectual/developmental (5.6%; aRR 5.34, 95% CI 4.36–6.53), and multiple disabilities (1.7%; aRR 3.09, 95% CI 2.56–3.72) had elevated risks of discharge to social services after the birth hospital stay, after adjusting for maternal sociodemographic and health characteristics. Findings were similar after further adjusting for health care and pregnancy characteristics (Figure 1).

Among women with multiple livebirths during the study period, those with physical (aOR 2.00, 95% CI 1.51–2.64), intellectual/developmental (aOR 8.53, 95% CI 4.64–15.68), and multiple disabilities (aOR 4.47, 95% CI 2.68–7.45) had increased odds of having ≥ 2 newborns discharged to social services. Those with sensory disabilities did not (Table 3).

Newborns of women with physical, sensory, intellectual/developmental, and multiple disabilities also had an increased risk of sustained maternal-newborn separation at 12 months (Table 4).

Finally, among newborns of women with physical (Supplementary Appendix 4), sensory (Supplementary Appendix 5), intellectual/developmental (Supplementary Appendix 6), and multiple disabilities (Supplementary Appendix 7), and

Table 2: Characteristics of newborns in Ontario, 2008–2019, by maternal disability status

Disability status	Physical	Sensory	Intellectual or developmental	Multiple	None
	<i>N</i> = 114,685	<i>N</i> = 38,268	<i>N</i> = 2,094	<i>N</i> = 8,075	<i>N</i> = 1,221,765
Maternal age					
15–24 years	16,628(14.5)	7,026(18.4) ^a	862(41.2) ^a	1,657(20.5) ^a	168,803(13.8)
25–34 years	69,358(60.5)	22,481(58.7)	917(43.8) ^a	4,572(56.6) ^a	777,677(63.7)
35–49 years	28,699(25.0)	8,761(22.9)	315(15.0) ^a	1,846(22.9)	275,285(22.5)
Multiparous	66,346(56.1)	20,814(54.4)	1,133(54.1)	4,497(55.7)	684,982(56.1)
Neighbourhood income Q1 or Q2	46,710(40.7)	15,996(41.7)	1,240(58.8) ^a	3,681(45.4)	517,774(42.2)
Social assistance	18,339(16.0) ^a	5,800(15.2) ^a	1,086(51.9) ^a	2,361(29.2) ^a	118,835(9.7)
Rural residence	15,241(13.2) ^a	4,329(11.3)	247(11.7)	1,053(13.0) ^a	117,252(9.6)
Stable chronic condition	35,260(30.7)	11,502(30.0)	612(29.2)	2,969(36.8) ^a	327,531(26.8)
Unstable chronic condition	19,245(16.8) ^a	5,877(15.4) ^a	370(17.6) ^a	1,880(23.3) ^a	143,059(11.7)
Mental illness	22,853(19.9) ^a	6,595(17.2) ^a	838(40.0) ^a	2,242(27.8) ^a	147,193(12.1)
Substance use disorder	2,805(2.5) ^a	506(1.3)	154(7.4) ^a	335(4.2) ^a	12,181(1.0)
No, inadequate, or intermediate prenatal care	30,450(26.6)	10,151(26.5)	663(31.7)	2,000(24.9)	342,100(28.0)
Severe maternal morbidity	4,248(3.7)	1,398(3.6)	94(4.5)	430(5.3) ^a	34,280(2.8)
Preterm birth	8,681(7.6)	2,793(7.3)	198(9.5) ^a	797(9.9) ^a	73,004(6.0)
Severe neonatal morbidity	11,042(9.6)	3,727(9.7)	262(12.5) ^a	918(11.4) ^a	99,545(8.1)

^aStandardized difference >0.10.

Table 3: Odds of multiple newborn discharges to social services, comparing women with and without disabilities who had multiple livebirths during the study period

Disability status	Unadjusted OR (95% CI)		Adjusted OR (95% CI) ^a		Adjusted OR (95% CI) ^b	
	≥2	1	≥2	1	≥2	1
No disability (<i>N</i> = 728,538)	Referent(1.00)	Referent(1.00)	Referent(1.00)	Referent(1.00)	Referent(1.00)	Referent(1.00)
Physical disability only (<i>N</i> = 69,585)	3.21 (2.44–4.21)	2.16 (1.89–2.49)	2.00 (1.51–2.64)	1.40 (1.21–1.62)	1.97 (1.48–2.60)	1.38 (1.19–1.59)
Sensory disability only (<i>N</i> = 23,645)	1.76 (1.01–3.09)	1.74 (1.36–2.22)	1.28 (0.73–2.25)	1.27 (0.98–1.63)	1.31 (0.75–2.31)	1.27 (0.99–1.64)
Intellectual/developmental disability only (<i>N</i> = 1,221)	36.11 (20.05–65.03)	21.77 (15.64–30.30)	8.53 (4.64–15.68)	5.39 (3.77–7.0)	8.74 (4.73–16.14)	5.47 (3.82–7.86)
Multiple disabilities (<i>N</i> = 4,818)	11.06 (6.74–18.2)	7.36 (5.67–9.56)	4.47 (2.68–7.45)	3.05 (2.30–4.03)	4.51 (2.69–7.56)	3.06 (2.31–4.06)

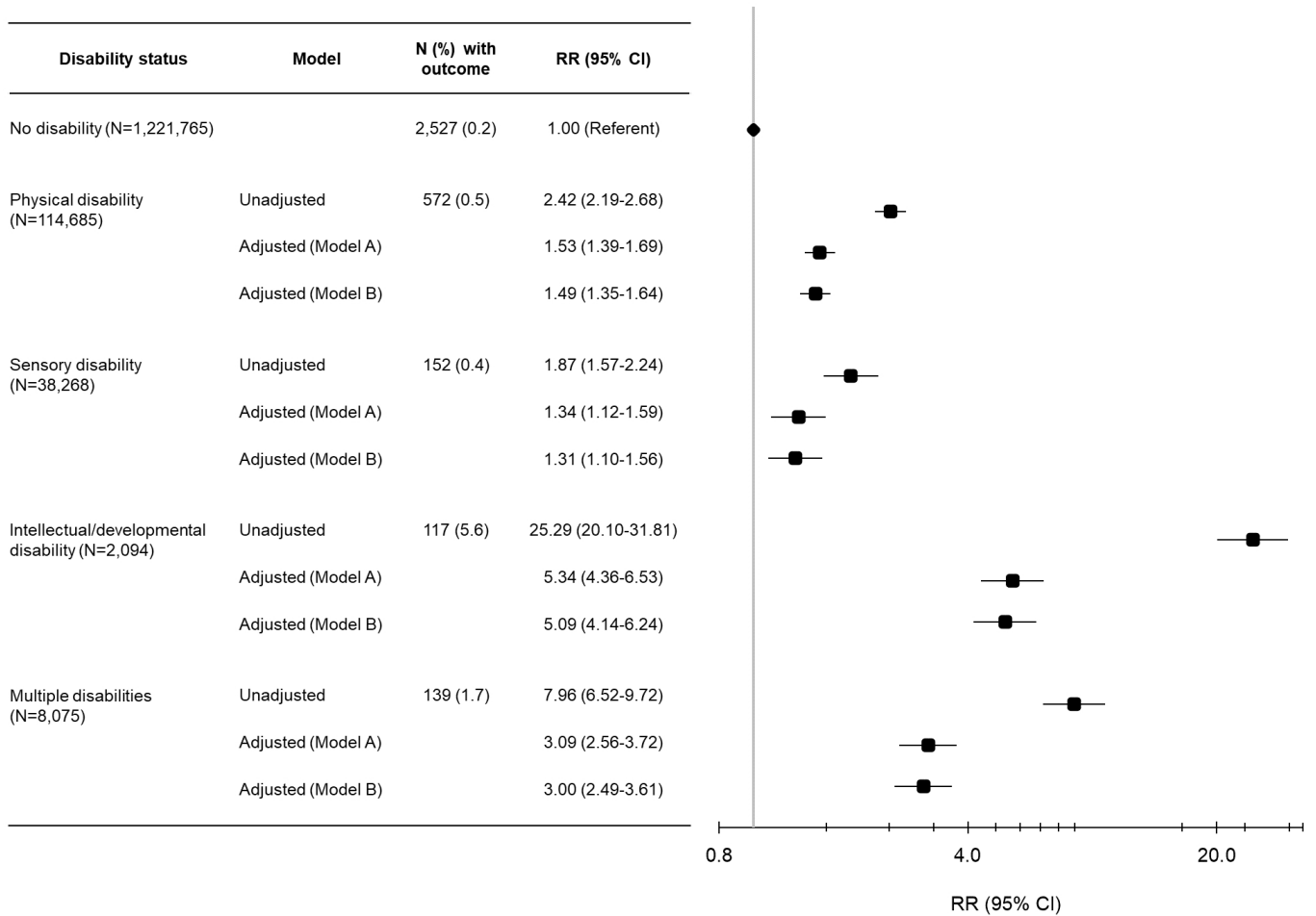
^aModel A adjusts for maternal age, parity, neighborhood income quintile, social assistance, rural residence, stable and unstable chronic conditions, mental illness, and substance use disorders.^bModel B adjusts for Model A variables as well as prenatal care adequacy, severe maternal morbidity, preterm birth, and severe neonatal morbidity.

newborns of women without disabilities (Supplementary Appendix 8), the strongest predictors of newborn discharge to social services were young maternal age, low neighbourhood income quintile, social assistance receipt, mental illness and substance use disorders; inadequate prenatal care; and severe neonatal morbidity.

Discussion

In this population-based cohort study, we found higher rates of discharge to social services, including sustained and multiple separations, among newborns of women with disabilities, with particularly high rates in newborns of women with

Figure 1: Risk of newborn discharge to social services, comparing women with and without disabilities



Model A adjusts for maternal age, parity, neighborhood income quintile, social assistance, rural residence, stable and unstable chronic conditions, mental illness, and substance use disorders. Model B adjusts for Model A variables as well as prenatal care adequacy, severe maternal morbidity, preterm birth, and severe neonatal morbidity.

Table 4: Risk of sustained maternal-newborn separation among newborns of women with and without disabilities

Disability status	Number (%) with outcome	Unadjusted RR (95% CI)	Adjusted RR (95% CI) ^a	Adjusted RR (95% CI) ^b
No disability (<i>N</i> = 1,221,765)	2,013 (0.2)	Referent (1.00)	Referent (1.00)	Referent (1.00)
Physical disability only (<i>N</i> = 114,685)	482 (0.4)	2.61 (2.34–2.92)	1.64 (1.47–1.83)	1.59 (1.43–1.78)
Sensory disability only (<i>N</i> = 38,268)	117 (0.3)	1.77 (1.44–2.17)	1.23 (1.00–1.52)	1.22 (0.99–1.49)
Intellectual/developmental disability only (<i>N</i> = 2,094)	108 (5.2)	29.00 (22.43–37.48)	6.12 (4.92–7.62)	5.85 (4.69–7.30)
Multiple disabilities (<i>N</i> = 8,075)	124 (1.5)	8.97 (7.24–11.12)	3.44 (2.81–4.22)	3.36 (2.75–4.11)

^aModel A adjusts for maternal age, parity, neighborhood income quintile, social assistance, rural residence, stable and unstable chronic conditions, mental illness, and substance use disorders.

^b Model B adjusts for Model A variables as well as prenatal care adequacy, severe maternal morbidity, preterm birth, and severe neonatal morbidity.

intellectual/developmental and multiple disabilities. Across all groups, the strongest predictors of newborn discharge to social services were indicators of young maternal age, poverty, maternal mental illness and substance use disorders,

inadequate prenatal care, and neonatal complications. Our findings suggest that women with disabilities and their newborns could benefit from the development of tailored, family-centred services, and that these services should target

social and mental health inequities as well as perinatal stressors such as newborn health issues. Many of these risk factors, such as living in poverty and experiencing poor health, might be mitigated by preconception and prenatal services, via comprehensive health and social care support, inclusive of family planning.

Several studies have described the over-representation of women with intellectual/developmental disabilities in child protection cases, with most studies examining children of any age and showing a prevalence of 26% to 87% across studies [33–35]. Only two studies have examined newborn discharge to social services in this population. In a study of 53,565 women in Manitoba, Canada, maternal intellectual/developmental disability was associated with a seven times greater odds of newborn discharge to social services [36]. Likewise, we previously found newborns of women with intellectual/developmental disabilities had an eight times greater risk of discharge to social services [21]. To our knowledge, no studies have examined this outcome across diverse disability groups, thus showing the novelty of our study. Our study also suggests that sustained and multiple separations are more likely to occur.

We know from previous research that a myriad of factors can increase the risk of children's social services involvement for families, including young maternal age, living in poverty, and maternal mental illness or substance use [9, 36]. In our study, as in previous research [37–39], we found that women with disabilities have higher rates of such concerns when compared to women with no disabilities. Our findings could therefore indicate that intersectional disadvantages and social vulnerability, of which disability status plays a role, increase the risk of children's social service involvement.

Additionally, professionals may have concerns around how maternal disabilities impact on safe parenting practices, for example, challenges with cognitive processes, such as memory or organisational skills, or physical capabilities, such as the mobility needed to lift a baby [40, 41]. From qualitative literature, we know women with disabilities fear judgement and assumptions around their parenting abilities [12], with women describing their needs as being largely unmet by services, with little or no access to interventions specific to parenting and child rearing with a disability [41]. These issues are important because studies show that up to 50% of disparities in developmental outcomes of children of women with intellectual/developmental disabilities, for example, could be explained by other factors such as poverty and lack of social support – which are amenable to intervention [42, 43]. Our findings could therefore illustrate more systemic and cultural barriers to parenthood for women with disabilities, including a lack of appropriate services to address the specific needs of parents with disabilities and those of their newborns. Our findings draw particular attention to the prompt involvement of children's social services at the point of birth, giving families a narrow window of opportunity to engage meaningfully with support and evidence their parenting capabilities [21].

Research suggests many mother-infant separations may be preventable through targeted and timely intervention that can improve outcomes associated with child abuse or neglect, including maternal health, family functioning, and the home environment [44–46]. Approaches to supporting parents at risk of children's social service involvement include

home visiting programs [47], parenting interventions [48], and family-focused casework. Effective interventions have been developed on principles of being strengths-based and flexible in supporting the needs of each family [44]. For example, a home-based intervention supporting parents with intellectual/developmental disabilities reported improvements in caregiving skills and knowledge associated with child safety [48]. Similarly, women with physical disabilities have described the usefulness of adaptations which enabled safer parenting practices, including furniture modifications, specialist equipment, and caregiving support from extended family [49]. Utilising wider social networks of support can be characteristic of child rearing practises within many families [50]. Yet, there is an assumption within child protection that parents must be able to evidence their parenting competency unsupported [51]. Supported and tailored services and resources for women with disabilities could enable them to care effectively for their children. Providing targeted support for women most at risk, including those with comorbid conditions and living in poverty, might reduce the risk of newborn removal for those families [36].

Analysis of administrative health records enables a large-scale examination of the population in Ontario, Canada, but there are limitations to this approach. We were not able to capture health needs that are not known to services or not captured within administrative records. We had no information on social services involvement after birth hospitalization discharge, and used a proxy of discordant maternal-infant postal codes at 12 months to examine whether newborn discharges to social services were sustained, which may not fully capture all cases of foster care and other longer-term separations. We also had no information on other supports around the time of pregnancy that might have impacted the risk of newborn discharge to social services, such as disability support programs, home visiting programs, or parenting skills classes. We also had no information on women's own history of social service involvement. This limitation highlights the importance of population-based health and social services data linkages to fully understand such experiences. Although we had information on a range of important sociodemographic, health, health care, and pregnancy characteristics, we were unable to examine some of these in detail (e.g., specific type of mental illness or substance use disorder). We were also unable to measure important equity-related variables such as race/ethnicity in these data. Indigenous and Black children are disproportionately represented in the care system across Canada [52, 53], and future research should aim to understand intersectional discrimination for families with children's social service involvement. Finally, while administrative health data provide a population-based, quantitative picture of important disparities, they do not provide information on individuals' experiences. Listening to the voices of women with disabilities with children's social service involvement would be an important next step in understanding needs and experiences of this population.

Conclusion

Women with disabilities may face more systemic challenges and assumptions about their parenting than other mothers.

While children's social services play a crucial role in protecting at-risk children from harm, such as abuse or neglect, there are instances where families may be supported to stay together safely. Our population-based study is the first to evidence the increased risk of newborn entry into social services among women with different types of disabilities. Targeted supports for women with disabilities at heightened risk of children's social service involvement are needed to prevent mother-newborn separation where possible. Comprehensive interventions should address disability-specific needs, as well as factors associated with increased risk of newborn separation, such as poverty, mental illness, substance use disorders, and perinatal complications.

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Statement of conflicts of interest

Simone N. Vigod receives royalties from UpToDate for authorship of materials on depression and pregnancy.

Ethics statement

ICES is a prescribed entity under Ontario's *Personal Health Information Protection Act* (PHIPA). Section 45 of PHIPA authorizes ICES to collect personal health information, without consent, for the purpose of analysis or compiling statistical information with respect to the management of, evaluation or

monitoring of, the allocation of resources to or planning for all or part of the health system. Projects that use data collected by ICES under section 45 of PHIPA, and use no other data, are exempt from research ethics board review. The use of the data in this project is authorized under section 45 and approved by ICES' Privacy and Legal Office.

Data availability

The dataset from this study is held securely in coded form at ICES. While legal data sharing agreements between ICES and data providers (e.g., healthcare organizations and government) prohibit ICES from making the dataset publicly available, access may be granted to those who meet pre-specified criteria for confidential access, available at www.ices.on.ca/DAS (email: das@ices.on.ca). The full dataset creation plan and underlying analytic code are available from the authors upon request, understanding that the computer programs may rely upon coding templates or macros that are unique to ICES and are therefore either inaccessible or may require modification.

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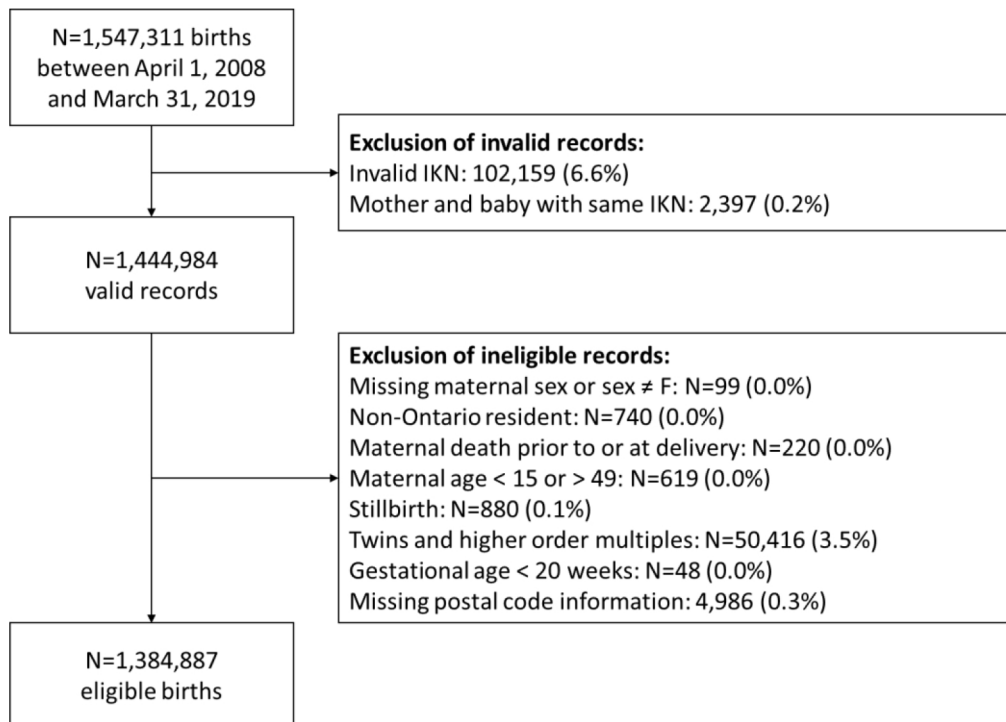
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Abbreviations

- CI: confidence interval
OR: odds ratio
RR: relative risk



Supplementary Appendix 1: Study flowchart



Supplementary Appendix 2: Ascertainment of disability status

Category	Details	Codes	Data sources
Physical disabilities: Congenital anomalies	Congenital deformities of the feet	ICD-9: 754.5–754.7; ICD-10: Q66; OHIP: 754	CIHI-DAD, NACRS, OHIP
	Congenital musculoskeletal deformities of the chest	ICD-9: 754.8; ICD-10: Q67.6, Q67.7, Q67.8	CIHI-DAD, NACRS
	Dwarfism, not elsewhere classified	ICD-9: 259.4; ICD-10: E34.3	CIHI-DAD, NACRS
	Hypopituitarism	ICD-9: 253.4; ICD-10: E23.0	CIHI-DAD, NACRS
	Other congenital anomalies of the nervous system	ICD-9: 742; ICD-10: Q01.9, Q02-Q04, Q06, Q07.8, Q07.9, G90.1; OHIP: 742	CIHI-DAD, NACRS, OHIP
	Other congenital musculoskeletal deformities	ICD-9: 756; ICD-10: Q75-Q79; OHIP: 756	CIHI-DAD, NACRS, OHIP
	Reduction defects of lower limb	ICD-9: 755.3; ICD-10: Q72	CIHI-DAD, NACRS
	Reduction defects of upper limb	ICD-9: 755.2; ICD-10: Q71	CIHI-DAD, NACRS
	Spina bifida	ICD-9: 741; ICD-10: Q05; OHIP: 741	CIHI-DAD, NACRS, OHIP
Physical disabilities: Musculoskeletal and connective tissue disorders	Syndactyly	ICD-9: 755.1; ICD-10: Q70; OHIP: 755	CIHI-DAD, NACRS, OHIP
	Acromegaly and gigantism	ICD-9: 253.0; ICD-10: E22.0	CIHI-DAD, NACRS
	Ankylosing spondylitis	ICD-9: 720; ICD-10: M45, M46; OHIP: 720	CIHI-DAD, NACRS, OHIP
	Polymyalgia rheumatica	ICD-9: 725; ICD-10: M35.3; OHIP: 725	CIHI-DAD, NACRS
	Rheumatoid arthritis	ICD-9: 714; ICD-10: M05, M06; OHIP: 714	CIHI-DAD, NACRS, OHIP
Physical disabilities: Neurological disorders	Spondylosis	ICD-9: 721; ICD-10: M47; OHIP: 721	CIHI-DAD, NACRS, OHIP
	Cerebral palsy	ICD-9: 343; ICD-10: G80; OHIP: 343	CIHI-DAD, NACRS, OHIP
	Disorders of autonomic nervous system	ICD-9: 337; ICD-10: G90	CIHI-DAD, NACRS
	Epilepsy	ICD-9: 345.0–345.1, 345.4–345.9; ICD-10: G40; OHIP: 345	CIHI-DAD, NACRS, OHIP
	Hemiplegia	ICD-9: 342; ICD-10: G81	CIHI-DAD, NACRS
	Hereditary and idiopathic neuropathy	ICD-9: 356; ICD-10: G60; OHIP: 356	CIHI-DAD, NACRS, OHIP
	Hereditary ataxia and other specified degenerative disorders of the nervous system classified elsewhere	ICD-9: 334; ICD-10: G11, G32.8	CIHI-DAD, NACRS
	Multiple sclerosis	ICD-9: 340; ICD-10: G35; OHIP: 340	CIHI-DAD, NACRS, OHIP
	Muscular dystrophy	ICD-9: 359.0; ICD-10: G71, G72; OHIP: 359	CIHI-DAD, NACRS, OHIP
	Myasthenia gravis	ICD-9: 358; ICD-10: G70. OHIP: 358	CIHI-DAD, NACRS
	Nerve root and plexus disorders	ICD-9: 353; ICD-10: G54, G55	CIHI-DAD, NACRS
	Other demyelinating diseases of central nervous system	ICD-9: 341; ICD-10: G36, G37	CIHI-DAD, NACRS
	Other disorders of spinal cord	ICD-9: 336; ICD-10: G95	CIHI-DAD, NACRS
	Other extrapyramidal and movement disorders	ICD-9: 333; ICD-10: G10, G23, G24.1-G24.9, G25	CIHI-DAD, NACRS
	Other paralytic syndromes	ICD-9: 344; ICD-10: G82, G83	CIHI-DAD, NACRS

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Supplementary Appendix 2: Continued

Category	Details	Codes	Data sources
Physical disabilities: Permanent injuries	Other polyneuropathies	ICD-9: 357; ICD-10: G61, G62, G63	CIHI-DAD, NACRS
	Other specified degenerative diseases of the nervous system	ICD-9: 331.8; ICD-10: G31.8	CIHI-DAD, NACRS
	Sequelae of cardiovascular disease	ICD-9: 438; ICD-10: I69	CIHI-DAD, NACRS
	Sequelae of poliomyelitis	ICD-9: 138; ICD-10: B91	CIHI-DAD, NACRS
	Spinal muscular atrophy and related syndromes	ICD-9: 335.1, 335.2, 335.8, 335.9; ICD-10: G12	CIHI-DAD, NACRS
	Brain injury	ICD-9: 800.1, 800.3, 801.1, 801.3, 802.6, 802.7, 803.1, 803.3, 804.1, 804.3, 850, 851-854, 907.0, 907.1; ICD-10: S02.0, S02.1, S02.3, S02.7-S02.9, S06.1-S06.9, S07, T02.0, T90.5	CIHI-DAD, NACRS
	Crushing injury of the lower limb	ICD-9: 928.0-928.2, 928.8; ICD-10: S77, S87, S97.0, T04.1, T04.3-T04.8	CIHI-DAD, NACRS
	Dependence on a wheelchair	ICD-9: V46.3; ICD-10: Z99.3	CIHI-DAD, NACRS
	Dependence on other enabling machines and devices	ICD-9: V46.8; ICD-10: Z99.8	CIHI-DAD, NACRS
	Fracture of the vertebral column with spinal cord injury	ICD-9: 806, 907.2, 952; ICD-10: S14.0, S14.1, S24.0, S24.1, S34.0, S34.1, S34.3, T06.0, T06.1, T91.3; OHIP: 806	CIHI-DAD, NACRS, OHIP
	Other acquired deformities of limbs	ICD-9: 736.8; ICD-10: M21.8	CIHI-DAD, NACRS
	Traumatic amputation of the lower limb	ICD-9: 896, 897, V49.7; ICD-10: S78, S88, S98.0, S98.3, T05, Z89.4-Z89.8	CIHI-DAD, NACRS
Hearing impairments	Traumatic amputation of the upper limb	ICD-9: 887, V49.6; ICD-10: S48, S58, S68.3, S68.4, Z89.1-Z89.3	CIHI-DAD, NACRS
	Conductive and sensorineural hearing loss	ICD-9: 389; ICD-10: H90, H91.3, H91.8, H91.9; OHIP: 389	CIHI-DAD, NACRS, OHIP
Vision impairments	Congenital malformations of ear causing impairment of hearing	ICD-9: 744.0; ICD-10: Q16.0, Q16.1, Q16.3-Q16.9	CIHI-DAD, NACRS
	Blindness and low vision	ICD-9: 369; ICD-10: H54; OHIP: 369	CIHI-DAD, NACRS, OHIP
	Cataracts	ICD-9: 366; ICD-10: H25, H26; OHIP: 366	CIHI-DAD, NACRS, OHIP
	Chorioretinal inflammation	ICD-9: 363; ICD-10: H30, H31	CIHI-DAD, NACRS
	Disorders of globe	ICD-9: 360; ICD-10: H44	CIHI-DAD, NACRS
	Disorders of the iris and ciliary body	ICD-9: 364.1; ICD-10: H20.1	CIHI-DAD, NACRS
	Disorders of visual cortex	ICD-9: 377.7; ICD-10: H47.6	CIHI-DAD, NACRS
	Glaucoma	ICD-9: 365; ICD-10: H40, H42; OHIP: 365	CIHI-DAD, NACRS, OHIP
	Other retinal disorders	ICD-9: 362; ICD-10: E10.31-E10.35, E11.31-E11.35, H34-H36; OHIP: 362	CIHI-DAD, NACRS, OHIP

Continued

Supplementary Appendix 2: Continued

Category	Details	Codes	Data sources
Developmental disabilities	Autism spectrum disorder	ICD-9: 299; ICD-10: F84.0, F84.1, F84.3-F84.9; OHIP: 299, DSM: Q2a, Q2b or Q2c (i.e., Axis I) in 299, 299.00, 299.1, 299.10, 299.8, 299.809 (and retired fields)	CIHI-DAD, NACRS, OHIP, OMHRS
	Fetal alcohol spectrum disorder	ICD-9: 760.71, 760.77; ICD-10: Q86.0	CIHI-DAD, NACRS
	Intellectual disability	ICD-9: 317–319; ICD-10: F70-F73, F78, F79; OHIP: 319, DSM: Q2d (i.e., Axis II) in 317, 318, 318.0, 318.1, 318.2, 319	CIHI-DAD, NACRS, OHIP, OMHRS
	Intellectual disability resulting from chromosomal anomalies	ICD-9: 758.0–758.3, 758.5, 758.8, 758.9; ICD-10: Q90, Q91, Q92.0–Q92.5, Q92.7–Q92.9, Q93, Q97.1, Q99.2, Q99.8, DSM: I11h–I11m = any diagnosis of Qxxx as listed in ICD-10 column	CIHI-DAD, NACRS, OMHRS
	Other intellectual disabilities	ICD-9: 759.5; ICD-10: Q85.1, Q86.1, Q87.1, Q87.23, Q87.31, Q87.8, DSM: I11h–I11m = any diagnosis of Qxxx as listed in ICD-10 column; Q3 = 1	CIHI-DAD, NACRS, OMHRS

Abbreviations: CIHI-DAD = Canadian Institute for Health Information Discharge Abstract Database; DSM = Diagnostic and Statistical Manual of Mental Disorders; ICD = International Classification of Diseases and Related Health Problems; NACRS = National Ambulatory Care Reporting System; OHIP = Ontario Health Insurance Plan Database; OMHRS = Ontario Mental Health Reporting System.



Supplementary Appendix 3: Ascertainment of covariates

Category	Details	Codes or definition	Datasets
Sociodemographic characteristics	Maternal age	Age at conception	RPDB
	Parity	Number of previous livebirths, based on PREVBIRTH	MOMBABY
	Neighbourhood income quintile	Census dissemination area-level measure of household income	Census, RPDB
	Social assistance	Eligibility for the Ontario Drug Benefits program, provided to individuals on social assistance, unable to work because of disability, or with high prescription costs	ODB
	Rural residence	Living in a town or municipality outside the commuting zone of centres with a population of 10,000 or more	Census, RPDB
Health characteristics	Maternal stable and unstable chronic conditions	Johns Hopkins Adjusted Clinical Groups System v. 10.0	CIHI-DAD, NACRS, OHIP, OMHRS
	Maternal mental illness	ICD-10: F06-F09, F20-F54, F55-F62, F63.1-F99; DSMIV: any OMHRS (excluding 290–292, 294, 303–305); OHIP: 295–298, 300–302, 306, 309, 311	CIHI-DAD, NACRS, OHIP, OMHRS
	Maternal substance use disorder	ICD-10: F10-F19, F55, F63.0; DSMIV: 291 (excluding 291.82), 292 (excluding 292.85), 303–305; OHIP: 303, 304	CIHI-DAD, NACRS, OHIP, OMHRS
Healthcare characteristics	Adequacy of prenatal care	Revised Graduated Prenatal Care Utilization Index, which reflects the timing and number of prenatal care visits	OHIP
Pregnancy characteristics	Severe maternal morbidity	ICD-10: D57.0, D65, F23, F53.1, G41, G93.6, I21, I22, I42, I43, I46, I49.0, I50, I60-I64, J81, K35, K37, J45.01, J45.11, J45.81, J45.91, K65, K71-K72, O14, O15, O22.5, O26.6 + RBCTRNSF='Y' or PLSTRNSF='Y', O29.0, O29.1, O29.2, O44.1 + RBCTRNSF='Y', O45.0, O46.0, O.65 + RBCTRNSF='Y', O67.0, O71.0, O71.1, O74.0, O74.1, O74.2, O74.3, O75.1, O75.3, O75.4, O85, O87.3, O88, O89.0, O89.1, O89.2, O90.3, O90.4, N17, N19, N73.3, N73.5, N99.0, R40.2, R57, T80.5, T88.6, SCUadmdate1–6 variable; CCI: 1.GZ.31.CA-ND, 1.GZ.31.CR-ND, 1.HZ.09, 1.HZ.30, 5.MD.60.RC, 5.MD.60.RD, 5.MD.60.KE, 5.MD.60.CB, 1.NK.80, 1.NM.80, (5.PC.80.JM or 5.PC.80.JH) + RBCTRNSF='Y', 5.PC.80.JR, 5.PC.80.JS + RBCTRNSF='Y', (5.PC.91.GA or 5.PC.91.GC or 5.PC.91.GD) + RBCTRNSF='Y', 5.PC.91.HP, 5.PC.91.HQ (exclude cesarean births, 5.MD.60), 1.PZ.21, (RBCTRNSF='Y' or [1.RM.13 or 1.KT.51 or 5.PC.91.LA or 5.PC.91.HV] or [5.MD.60.RC, 5.MD.60.RD, 5.MD.60.KE, 5.MD.60.CB, 1.RM.89.LA] or [1.RM.87.LA-GX]), 1.RM.89.LA, 1.RM.87.LA-GX	CIHI-DAD

Continued

Supplementary Appendix 3: Continued

Category	Details	Codes or definition	Datasets
	Preterm birth	Birth < 37 weeks, based on B_GESTWKS_DEL	MOMBABY
	Severe neonatal morbidity	ICD-10: P14, P22, P29, P36, P39, P52.2, P90, P91.2, P91.6	CIHI-DAD

Abbreviations: CCI = Canadian Classification of Interventions; CIHI-DAD = Canadian Institute for Health Information Discharge Abstract Database; DSM = Diagnostic and Statistical Manual of Mental Disorders; ICD = International Classification of Diseases and Related Health Problems; NACRS = National Ambulatory Care Reporting System; ODB = Ontario Drug Benefits database; OHIP = Ontario Health Insurance Plan Database; OMHRS = Ontario Mental Health Reporting System; RPDB = Registered Persons Database.



Supplementary Appendix 4: Predictors of discharge to social services among newborns of women with a physical disability

Predictor	Number (%) with outcome	Unadjusted RR (95% CI)	Adjusted RR (95% CI)
Maternal age			
15–24 years	195 (1.17)	2.30 (1.85–2.87)	1.40 (1.33–1.72)
25–34 years	280 (0.40)	Referent (1.00)	Referent (1.00)
35–49 years	97 (0.34)	0.86 (0.69–1.08)	1.05 (0.83–1.33)
Parity			
Primiparous	133 (0.28)	Referent (1.00)	Referent (1.00)
Multiparous	439 (0.66)	2.11 (1.78–2.50)	1.76 (1.44–2.15)
Neighborhood income quintile			
Q3–5 (middle-high)	134 (0.20)	Referent (1.00)	Referent (1.00)
Q1–2 (low)	438 (0.94)	4.00 (3.27–4.89)	1.86 (1.50–2.30)
Social assistance			
No	116 (2.49)	Referent (1.00)	Referent (1.00)
Yes	456 (0.12)	17.90 (14.42–22.22)	8.02 (6.20–10.38)
Region of residence			
Urban	504 (0.45)	Referent (1.00)	Referent (1.00)
Rural	68 (0.51)	0.92 (0.70–1.20)	0.78 (0.60–1.02)
Stable chronic condition			
No	412 (0.52)	Referent (1.00)	Referent (1.00)
Yes	160 (0.45)	0.90 (0.74–1.08)	0.90 (0.74–1.10)
Unstable chronic conditions			
No	469 (0.49)	Referent (1.00)	Referent (1.00)
Yes	103 (0.54)	1.13 (0.91–1.40)	0.95 (0.76–1.18)
Mental illness			
No	222 (1.53)	Referent (1.00)	Referent (1.00)
Yes	350 (0.24)	5.11 (4.22–6.18)	2.04 (1.63–2.55)
Substance use disorder			
No	370 (0.33)	Referent (1.00)	Referent (1.00)
Yes	202 (7.20)	16.50 (12.94–21.04)	3.08 (2.60–3.65)
Prenatal care adequacy			
Adequate/intensive	262 (0.31)	Referent (1.00)	Referent (1.00)
None/inadequate/intermediate	310 (1.02)	3.00 (2.54–3.57)	3.08 (2.60–3.65)
Severe maternal morbidity			
No	530 (0.48)	Referent (1.00)	Referent (1.00)
Yes	42 (0.99)	1.96 (1.41–2.74)	1.59 (1.14–2.21)
Preterm birth			
No	460 (0.43)	Referent (1.00)	Referent (1.00)
Yes	112 (1.29)	2.75 (2.19–3.44)	1.53 (1.20–1.95)
Severe neonatal morbidity			
No	435 (0.42)	Referent (1.00)	Referent (1.00)
Yes	137 (1.24)	2.64 (2.14–3.25)	1.78 (1.42–2.24)

Supplementary Appendix 5: Predictors of discharge to social services among newborns of women with a sensory disability

Predictor	Number (%) with outcome	Unadjusted RR (95% CI)	Adjusted RR (95% CI)
Maternal age			
15–24 years	88 (1.25)	4.62 (3.15–6.76)	1.98 (1.24–3.15)
25–34 years	50 (0.22)	Referent (1.00)	Referent (1.00)
35–49 years	14 (0.16)	0.74 (0.42–1.31)	1.00 (0.56–1.78)
Parity			
Primiparous	56 (0.32)	Referent (1.00)	Referent (1.00)
Multiparous	96 (0.46)	1.28 (0.92–1.78)	1.24 (0.85–1.81)
Neighborhood income quintile			
Q3–5 (middle-high)	38 (0.17)	Referent (1.00)	Referent (1.00)
Q1–2 (low)	114 (0.71)	2.92 (1.91–4.48)	1.76 (1.16–2.65)
Social assistance			
No	41 (0.13)	Referent (1.00)	Referent (1.00)
Yes	111 (1.91)	10.72 (6.84–16.79)	5.30 (3.17–8.86)
Region of residence			
Urban	134 (0.39)	Referent (1.00)	Referent (1.00)
Rural	18 (0.42)	1.10 (0.62–1.95)	1.04 (0.63–1.72)
Stable chronic condition			
No	124 (0.46)	Referent (1.00)	Referent (1.00)
Yes	28 (0.24)	0.58 (0.38–0.89)	0.72 (0.44–1.18)
Unstable chronic conditions			
No	136 (0.42)	Referent (1.00)	Referent (1.00)
Yes	16 (0.27)	0.70 (0.41–1.22)	0.74 (0.41–1.35)
Mental illness			
No	74 (0.23)	Referent (1.00)	Referent (1.00)
Yes	78 (1.18)	3.87 (2.58–5.80)	1.88 (1.21–2.93)
Substance use disorder			
No	118 (0.31)	Referent (1.00)	Referent (1.00)
Yes	34 (6.72)	18.39 (11.00–30.73)	4.74 (2.80–8.04)
Prenatal care adequacy			
Adequate/intensive	80 (0.28)	Referent (1.00)	Referent (1.00)
None/inadequate/intermediate	72 (0.71)	2.34 (1.66–3.29)	2.28 (1.62–3.21)
Severe maternal morbidity			
No	143 (0.39)	Referent (1.00)	Referent (1.00)
Yes	9 (0.64)	1.83 (0.93–3.58)	1.92 (0.97–3.79)
Preterm birth			
No	130 (0.37)	Referent (1.00)	Referent (1.00)
Yes	22 (0.79)	1.91 (1.07–3.42)	1.04 (0.59–1.84)
Severe neonatal morbidity			
No	111 (0.32)	Referent (1.00)	Referent (1.00)
Yes	41 (1.10)	3.29 (2.21–4.90)	2.83 (1.83–4.38)

Supplementary Appendix 6: Predictors of discharge to social services among newborns of women with an intellectual/developmental disability

Predictor	Number (%) with outcome	Unadjusted RR (95% CI)	Adjusted RR (95% CI)
Maternal age			
15–24 years	65 (7.54)	1.50 (1.02–2.20)	1.18 (0.78–1.79)
25–34 years	41 (4.47)	Referent (1.00)	Referent (1.00)
35–49 years	11 (3.49)	0.75 (0.40–1.43)	1.27 (0.65–2.49)
Parity			
Primiparous	54 (5.62)	Referent (1.00)	Referent (1.00)
Multiparous	63 (5.56)	0.98 (0.70–1.36)	1.01 (0.69–1.47)
Neighborhood income quintile			
Q3–5 (middle-high)	22 (2.58)	Referent (1.00)	Referent (1.00)
Q1–2 (low)	95 (7.66)	2.53 (1.62–3.94)	1.83 (1.14–2.94)
Social assistance			
No	20 (1.98)	Referent (1.00)	Referent (1.00)
Yes	97 (8.93)	4.04 (2.50–6.53)	2.82 (1.60–4.96)
Region of residence			
Urban	106 (5.71)	Referent (1.00)	Referent (1.00)
Rural	11 (4.61)	0.79 (0.40–1.54)	0.74 (0.39–1.41)
Stable chronic condition			
No	99 (6.68)	Referent (1.00)	Referent (1.00)
Yes	18 (2.94)	0.49 (0.31–0.80)	0.49 (0.29–0.80)
Unstable chronic conditions			
No	93 (5.39)	Referent (1.00)	Referent (1.00)
Yes	24 (6.49)	1.28 (0.82–1.98)	1.23 (0.81–1.87)
Mental illness			
No	41 (3.26)	Referent (1.00)	Referent (1.00)
Yes	76 (9.07)	2.66 (1.83–3.88)	1.78 (1.19–2.67)
Substance use disorder			
No	91 (4.69)	Referent (1.00)	Referent (1.00)
Yes	26 (16.88)	3.49 (2.24–5.43)	1.95 (1.23–3.09)
Prenatal care adequacy			
Adequate/intensive	61 (4.26)	Referent (1.00)	Referent (1.00)
None/inadequate/intermediate	56 (8.45)	1.85 (1.25–2.72)	1.91 (1.32–2.77)
Severe maternal morbidity			
No	109 (5.45)	Referent (1.00)	Referent (1.00)
Yes	8 (8.51)	1.63 (0.82–3.28)	1.63 (0.81–3.31)
Preterm birth			
No	96 (5.06)	Referent (1.00)	Referent (1.00)
Yes	21 (10.61)	1.97 (1.23–3.15)	1.42 (0.86–2.32)
Severe neonatal morbidity			
No	90 (4.91)	Referent (1.00)	Referent (1.00)
Yes	27 (10.31)	2.15 (1.45–3.17)	1.73 (1.15–2.60)

Supplementary Appendix 7: Predictors of discharge to social services among newborns of women with multiple disabilities

Predictor	Number (%) with outcome	Unadjusted RR (95% CI)	Adjusted RR (95% CI)
Maternal age			
15–24 years	68 (4.10)	2.79 (1.86–4.18)	1.74 (1.21–2.50)
25–34 years	58 (1.27)	Referent (1.00)	Referent (1.00)
35–49 years	13 (0.70)	0.65 (0.38–1.12)	0.86 (0.48–1.56)
Parity			
Primiparous	51 (1.43)	Referent (1.00)	Referent (1.00)
Multiparous	88 (1.96)	1.21 (0.87–1.70)	1.29 (0.91–1.82)
Neighborhood income quintile			
Q3–5 (middle-high)	31 (0.71)	Referent (1.00)	Referent (1.00)
Q1–2 (low)	108 (2.93)	3.31 (2.17–5.04)	1.73 (1.16–2.59)
Social assistance			
No	10 (0.18)	Referent (1.00)	Referent (1.00)
Yes	129 (5.46)	27.35 (14.39–52.00)	14.80 (7.61–28.82)
Region of residence			
Urban	121 (1.72)	Referent (1.00)	Referent (1.00)
Rural	18 (1.72)	1.12 (0.66–1.92)	1.22 (0.73–2.05)
Stable chronic condition			
No	91 (1.78)	Referent (1.00)	Referent (1.00)
Yes	48 (1.62)	1.06 (0.73–1.53)	1.00 (0.69–1.44)
Unstable chronic conditions			
No	100 (1.61)	Referent (1.00)	Referent (1.00)
Yes	39 (2.07)	1.05 (0.67–1.65)	1.03 (0.67–1.58)
Mental illness			
No	53 (0.91)	Referent (1.00)	Referent (1.00)
Yes	86 (3.84)	3.64 (2.54–5.20)	1.63 (1.10–2.41)
Substance use disorder			
No	103 (1.33)	Referent (1.00)	Referent (1.00)
Yes	36 (10.75)	5.85 (3.41–10.03)	1.98 (1.25–3.13)
Prenatal care adequacy			
Adequate/intensive	79 (1.30)	Referent (1.00)	Referent (1.00)
None/inadequate/intermediate	60 (3.00)	2.09 (1.41–3.09)	2.24 (1.60–3.13)
Severe maternal morbidity			
No	126 (1.65)	Referent (1.00)	Referent (1.00)
Yes	13 (3.01)	1.56 (0.70–3.51)	1.27 (0.67–2.34)
Preterm birth			
No	117 (1.61)	Referent (1.00)	Referent (1.00)
Yes	22 (2.76)	1.70 (0.97–2.98)	1.12 (0.67–1.87)
Severe neonatal morbidity			
No	109 (1.52)	Referent (1.00)	Referent (1.00)
Yes	30 (3.27)	2.13 (1.36–3.31)	1.78 (1.15–2.77)

Supplementary Appendix 8: Predictors of discharge to social services among newborns of women without a disability

Predictor	Number (%) with outcome	Unadjusted RR (95% CI)	Adjusted RR (95% CI)
Maternal age			
15–24 years	1,174 (0.70)	3.79 (3.42–4.20)	1.93 (1.74–2.15)
25–34 years	1,092 (0.14)	Referent	Referent
35–49 years	261 (0.09)	0.69 (0.61–0.79)	0.88 (0.76–1.01)
Parity			
Primiparous	737 (0.14)	Referent (1.00)	Referent (1.00)
Multiparous	1,790 (0.26)	1.68 (1.55–1.82)	1.57 (1.44–1.72)
Neighborhood income quintile			
Q3–5 (middle-high)	726 (0.10)	Referent (1.00)	Referent (1.00)
Q1–2 (low)	1,801 (0.35)	2.85 (2.59–3.13)	1.52 (1.38–1.67)
Social assistance			
No	764 (0.07)	Referent (1.00)	Referent (1.00)
Yes	1,763 (1.48)	18.07 (16.44–19.86)	7.51 (6.65–8.47)
Region of residence			
Urban	2,205 (0.20)	Referent (1.00)	Referent (1.00)
Rural	322 (0.28)	1.32 (1.15–1.52)	0.91 (0.80–1.03)
Stable chronic condition			
No	2,101 (0.23)	Referent (1.00)	Referent (1.00)
Yes	426 (0.13)	0.60 (0.54–0.67)	0.70 (0.629–0.78)
Unstable chronic conditions			
No	2,267 (0.21)	Referent (1.00)	Referent (1.00)
Yes	260 (0.18)	0.90 (0.78–1.02)	0.85 (0.75–0.98)
Mental illness			
No	1,234 (0.11)	Referent (1.00)	Referent (1.00)
Yes	1,293 (0.88)	6.36 (5.80–6.96)	2.57 (2.31–2.85)
Substance use disorder			
No	1,840 (0.15)	Referent (1.00)	Referent (1.00)
Yes	687 (5.64)	25.73 (22.28–29.71)	4.22 (3.74–4.77)
Prenatal care adequacy			
Adequate/intensive	1,091 (0.12)	Referent (1.00)	Referent (1.00)
None/inadequate/intermediate	1,436 (0.42)	3.01 (2.76–3.28)	3.06 (2.81–3.33)
Severe maternal morbidity			
No	2,413 (0.20)	Referent (1.00)	Referent (1.00)
Yes	114 (0.33)	1.56 (1.27–1.92)	1.29 (1.06–1.56)
Preterm birth			
No	2,052 (0.18)	Referent (1.00)	Referent (1.00)
Yes	475 (0.65)	3.33 (2.91–3.68)	2.07 (1.83–2.34)
Severe neonatal morbidity			
No	2,010 (0.18)	Referent (1.00)	Referent (1.00)
Yes	517 (0.52)	2.72 (2.44–3.03)	1.84 (1.65–2.07)