The Effect of Maternal Health Problems on the Health Outcomes of Children Attending Special Education Schools in Sulaimani City

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ABSTRACT

Background: Maternal health problems significantly impact child development, influencing physical, cognitive, and emotional well-being. This study investigates the effect of maternal health issues on child health outcomes among children attending special education schools in Sulaimani City.

Methods: A descriptive, quantitative study was conducted among 100 mothers of children enrolled in two special education schools. Data were collected between October and December 2022 using a structured questionnaire covering socio-demographics, maternal health issues, and child health status. A purposive sampling technique was used to recruit participants. Ethical considerations, including informed consent and confidentiality, were strictly observed.

Results: The study identified significant associations between maternal health conditions, including chronic illnesses, mental health disorders, pregnancy-related complications, and adverse child health outcomes. Children of mothers with persistent health problems exhibited higher rates of developmental delays, behavioral issues, and frequent illnesses, necessitating specialized healthcare and educational interventions. Furthermore, maternal health service utilization and preventive care were associated with better child health outcomes, underscoring the importance of accessible maternal healthcare services.

Conclusion: Maternal health plays a critical role in shaping child health and developmental outcomes, particularly in special education settings. Strengthening maternal healthcare services, early interventions, and integrated maternal-child health programs could improve overall outcomes for both mothers and children.

Keywords: Child Health Outcomes, Developmental delays, Maternal health problems, Special education, Sulaimani City.

تأثير مشاكل صحة الأم على النتائج الصحية للأطفال الملتحقين بمدارس التربية الخاصة في مدينة السليمانية

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الخلاصة

الخلفية: تؤثر مشاكل صحة الأم بشكل عميق على نمو الطفل ورفاهيته، وتؤثر على الصحة البدنية والإدراكية والعاطفية. تستكشف هذه الدراسة تأثير مشاكل صحة الأم على النتائج الصحية للأطفال الذين يلتحقون بمدارس التعليم الخاص في مدينة السليمانية.

الطرق: تم استخدام تصميم بحثي كمي وصفي، يستهدف أمهات الأطفال المسجلين في مدرستين للتعليم الخاص في مدينة السليمانية. تم جمع البيانات بين أكتوبر وديسمبر ٢٠٢٢ باستخدام استبيان منظم. تم استخدام أسلوب أخذ العينات الهادف لتجنيد ١٠٠ أم استوفت معايير الإدراج. تضمن الاستبيان معلومات اجتماعية وديموغرافية وقضايا صحة الأم والحالة الصحية للطفل. تمت مراعاة الاعتبارات الأخلاقية، بما في ذلك الموافقة المستنيرة والسرية، بشكل صارم.

النتائج: حددت الدراسة ارتباطات مهمة بين حالات صحة الأم، مثل الأمراض المزمنة واضطرابات الصحة العقلية والمضاعفات المرتبطة بالحمل والنتائج السلبية على صحة الطفل. أظهر أطفال الأمهات اللاتي يعانين من مشاكل صحية مستمرة معدلات أعلى من تأخر النمو، ومشاكل سلوكية، وأمراض متكررة، مما استلزم تدخلات تعليمية ورعاية صحية متخصصة.
الخلاصة: تلعب صحة الأم دورًا حاسمًا في تشكيل نتائج صحة الطفل، وخاصة في الفئات السكانية التي تتطلب تعليمًا خاصًا. وتؤكد النتائج على أهمية دمج دعم صحة الأم مع خدمات صحة الطفل والتعليم لتحسين النتائج لكل من الأمهات والأطفال.

الكلمات الرئيسية: مشاكل صحة الأم، نتائج صحة الطفل، التعليم الخاص، تأخر النمو، مدينة السليماني.

INTRODUCTION

Maternal health plays a crucial role in determining the health outcomes of newborns. Pregnant women with unmanaged health conditions face a higher risk of complications, including birth defects, stillbirth, and preterm birth. Addressing maternal health issues is essential, not only for the well-being of mothers but also for ensuring optimal child health outcomes. Comprehensive prenatal care and early intervention can significantly reduce these risks by managing pre-existing conditions and promoting maternal well-being [1].

Several maternal health conditions have been identified as major contributors to adverse child health outcomes. Chronic diseases such as diabetes, hypertension, and epilepsy can affect fetal development, leading to complications such as preterm birth, low birth weight, and congenital abnormalities. Infectious diseases, including HIV, syphilis, and malaria, also pose significant risks, as they can be transmitted from mother to child, causing severe neonatal health complications. Additionally, maternal substance use, including smoking and drug abuse, increases the likelihood of birth defects, low birth weight, and developmental delays. Mental health disorders, such as depression and anxiety, may further impact fetal growth and cognitive development due to stress-related hormonal imbalances and inadequate prenatal care [2].

Age-related maternal health risks also contribute to newborn health outcomes. Advanced maternal age, particularly pregnancies occurring after the age of 35, has been associated with an increased risk of chromosomal abnormalities, including Down syndrome, as well as pregnancy complications such as gestational diabetes and preeclampsia. Conversely, younger mothers, even in the absence of pre-existing health conditions, may still experience high-risk pregnancies due to genetic or structural fetal anomalies [3].

Moreover, maternal health concerns such as infections, chronic illnesses, and poor nutritional status can lead to preterm birth, defined as delivery before 37 weeks of gestation. Preterm birth is a leading cause of neonatal morbidity and mortality, often resulting in respiratory distress, feeding difficulties, and long-term developmental impairments. Similarly, maternal malnutrition and inadequate prenatal care contribute to low birth weight, which is associated with an increased risk of neonatal infections, hypoglycemia, and delayed growth[4]. Beyond immediate neonatal complications, maternal health conditions can also lead to congenital abnormalities, ranging from minor structural defects to life-threatening conditions. Birth defects affecting the heart, brain, and nervous system, such as neural tube defects, are among the most common outcomes linked to poor maternal health during pregnancy. Furthermore, newborns are highly susceptible to infections such as pneumonia, meningitis, and sepsis, some of which may have been influenced by maternal health conditions during pregnancy [5].

Given the wide-ranging impact of maternal health on child development, this study aims to examine the relationship between maternal health problems and the health outcomes of children attending special education schools in Sulaimani City. By identifying key maternal health factors that contribute to adverse neonatal and childhood outcomes, this research seeks to inform healthcare strategies that enhance maternal and child well-being.

MATERIALS AND METHODS

This quantitative, descriptive study investigated the impact of maternal health problems on the health outcomes of children attending two special education schools in Sulaimani City. The study aimed to explore potential associations between maternal health conditions and child health concerns, particularly in children requiring specialized education. Data collection was conducted between October and December 2022.

A purposive sampling method was utilized, selecting 100 mothers whose children were enrolled in these schools. This approach ensured the inclusion of participants relevant to the research objectives; however, it introduced a potential selection bias, limiting the generalizability of findings to broader populations. Mothers were eligible to participate if they had a child enrolled in the selected schools, were willing to take part in the study, and provided informed consent.

Data were gathered using a structured questionnaire, which included three key sections: (1) socio-demographic characteristics of both mothers and children, such as maternal age, education, occupation, marital status, and child's age, gender, and diagnosis; (2) maternal health conditions, including pre-existing medical issues (hypertension, diabetes, obesity, anemia, and mental health disorders); and (3) child health outcomes, assessing the presence of learning disabilities and co-existing conditions.

Ethical approval was obtained from the relevant institutional review board, and permission was secured from school authorities. Prior to participation, mothers were provided with detailed information about the study's purpose, procedures, and confidentiality measures. Written informed consent was obtained from all participants, and strict data confidentiality was maintained. Participation was voluntary, and mothers had the right to withdraw at any stage without consequences.

Data analysis was performed using Statistical Package for Social Sciences (SPSS version 24). Descriptive statistics, including frequency, percentage, mean, and standard deviation, were used to summarize the data. Inferential statistical methods included logistic regression and multinomial logistic regression models to examine associations between maternal health conditions and child health outcomes. The significance level was set at $p < 0.05$.

RESULTS

Table (1): socio-demographic characteristics of parents

Mother socio-demographic		**Fr. (%)**
age	< 35	17(17.0)
	35 – 45	46(46.0)
	> 45	37(37.0)
	Mean ± S.D	42.7±7.8
Occupation	Employee	23(23.0)
	Teacher	26(26.0)
	free work	3(3.0)
	Housewife	47(47.0)
	Others	1(1.0)
education level	Illiterate	17(17.0)
	Primary	23(23.0)
	Secondary	21(21.0)
	higher education	39(39.0)
Smoking	No	99(99.0)
	Yes	1(1.0)
Total		100(100.0)

Table1: shows the socio-demographic characteristics of mothers. The age of the majority of mothers was between 35 and 45 years, representing 46 (46.0%), with a mean age of 42 years. Nearly half of the mothers (47.0%) were housewives. Regarding education, 39.0% of the mothers had graduated from higher education. Additionally, 99.0% of the mothers had not smoked.

Table (2): Maternal health condition characteristics

Maternal health condition		Fr. (%)	Mother health condition		Fr. (%)
Mother age of this child	< 25	21(21.0)	age of mother in primigravida	< 25	14(14.0)
	25 – 35	38(38.0)		25 – 35	76(76.0)
	> 35	41(41.0)		> 35	10(10.0)
Mother BMI	Underweight	0(0.0)	previous c\s	0	18(18.0)
	Normal	26(26.0)		1	40(40.0)
	Overweight	44(44.0)		2	20(20.0)
	Obese	30(30.0)		3	17(17.0)
	Mean±S.D	27.92±4.09		4	5(5.0)
consanguineous	No	70(70.0)	c\s for this child	No	34(34.0)
	Yes	30(30.0)		Yes	66(66.0)
Mother utilization of health service	No	11(11.0)	Forceps-vacuum delivery	No	98(98.0)
	Yes	89(89.0)		Yes	2(2.0)
Postpartum hemorrhage	No	99(99.0)	antepartum hemorrhage	No	95(95.0)
	Yes	1(1.0)		Yes	5(5.0)
Abortion	0	57(57)		5 – 6	15(15.0)
	1	23(23.0)		7 – 8	1(1.0)
	2	13(13.0)		> 8	4(4.0)
amniotic fluid	Normal	87(87.0)	Mother drug use during this pregnancy.	No	88(88.0)
	Oligohydramnios	8(8.0)		Pregnel	1(1.0)
	Polyhydramnios	5(5.0)		Thyroxine	2(2.0)
Twin	No	9(91.0)		heparin	1(1.0)
	Yes	9(9.0)		Antimigration	1(1.0)
folic acid use during pregnancy	No	26(26.0)		Anti-typhoid	2(2.0)
	Yes	74(74.0)			
folic acid use before pregnancy	No	88(88.0)		hormonal treatment	2(2.0)
	Yes	12(12.0)		chemical	1(1.0)
Stress	No	71(71.0)		Antidiabetic	1(1.0)
	Yes	29(29.0)		Anti hypertension	1(1.0)
renal problem	No	96(96.0)	breast feeding	No	44(44.0)
	Yes	4(4.0)		Yes	56(56.0)
Diabetes Mellites	No	92(92.0)	placenta problem	No	95(95.0)
	Yes	8(8.0)		Yes	5(5.0)
Hypertension	No	93(93.0)	X-Ray exposure	No	98(98.0)
	Yes	7(7.0)		Yes	2(2.0)
Infection	No	100(100.0)	Pre Eclamptic-Toxemia	No	96(96.0)
	Yes	0(0.0)		Yes	4(4.0)
Anemia	Mild	29(29.0)	cardiac problem	No	92(92.0)
	Normal	60(60.0)		Yes	8(8.0)
	Moderate	2(2.0)	thyroid gland problem	No	18(18.0)
	Sever	9(9.0)		Yes	82(82.0)
Total		100(100.0)	Total		100(100.0)

Table 2 reveals that 41.0% of mothers were over 35 years old during pregnancy, and 44.0% had an overweight BMI. A large proportion (89.0%) utilized health services, and 70.0% were not consanguineous. Most mothers had no postpartum hemorrhage (99.0%) or child deaths (85.0%), with 23.0% having experienced one abortion. Regarding pregnancy conditions, 87.0% had normal amniotic fluid, 91.0% did not have a twin pregnancy, and 74.0% used folic acid. Diabetes was present in 8.0% of cases, and 96.0% had no renal issues. The majority of deliveries were by cesarean section (66.0%), with 76.0% of mothers aged 25–35 during their first pregnancy. Forceps or vacuum deliveries were rare (2.0%). Additionally, 87.0% avoided drug use, 56.0% breastfed, and 95.0% had no placenta problems. Pre-eclampsia (96.0%) and cardiac problems (92.0%) were uncommon, while 82.0% of mothers reported thyroid issues. These characteristics highlight key maternal health factors that may influence neonatal and child health outcomes.

Table (3): Child outcome characteristics

Child outcome		**Fr. (%)**	**Child outcome**		**Fr. (%)**
Sex	Male	71(71.0)	respiratory problem	No	62(62.0)
	Female	29(29.0)		Yes	38(38.0)
delay in crying	No	58(58.0)	neonatal jaundice	No	56(56.0)
	Yes	42(42.0)		Yes	44(44.0)
oxygen needs	No	67(67.0)	birth injury	No	99(99.0)
	Yes	33(33.0)		Yes	1(1.0)
cord problem	No	99(99.0)	fetal presentation	Abnormal	5(5.0)
	Yes	1(1.0)		Normal	95(95.0)
congenital anomalies	No	74(74.0)	Sleeping	Bad	29(29.0)
	septal defect	26(26.0)		Good	70(70.0)
Behavior	Bad	30(30.0)		Very good	1(1.0)
	Nervous	21(21.0)	Feeding	Bad	9(9.0)
	Good	49(49.0)		Good	89(89.0)
child's health problems (outcomes)	down syndrome	33(33.0)		Very good	1(1.0)
	delay in speaking	1(1.0)		Very bad	1(1.0)
	memory defect	4(4.0)	Memory	Bad	41(41.0)
	Autism	30(30.0)		Good	56(56.0)
	Cerebral palsy	20(20.0)		Very good	1(1.0)
	speech problem	6(6.0)		Very bad	2(2.0)
	growth restriction	1(1.0)	Movement	bad	16(16.0)
	ADHD	2(2.0)		Normal	39(39.0)
	Ataxia	1(1.0)		very active	38(38.0)
	delay brain growth	1(1.0)		Very bad	4(4.0)
	delay growth	1(1.0)		slow	1(1.0)
Birth weight	2 – 2.99kg	43(43.0)		no movement	2(2.0)
	3 – 4kg	49(49.0)	Speaking	Bad	55(55.0)
	> 4kg	8(8.0)		Good	34(34.0)
Admission to Neonatal Intensive Care Unit (NICU)	No	57(57.0)		no speaking	3(3.0)
	Yes	43(43.0)		Very bad	8(8.0)
Total		100(100.0)	Total		100(100.0)

Table 3 presents the demographic data and health outcomes of the children. The majority (71.0%) were male, and nearly half (49.0%) had a birth weight between 3 and 4 kg. More than half (57.0%) were not admitted to the Neonatal Intensive Care Unit (NICU).

Regarding health outcomes, 58.0% did not experience delayed crying at birth, and 67.0% did not require oxygen treatment. Most children had no cord-related problems (99.0%) or congenital anomalies (74.0%). Nearly half (49.0%) displayed good behavior. However, some children were diagnosed with Down syndrome (33.0%), autism (30.0%), cerebral palsy (20.0%), speech problems (6.0%), or ADHD (2.0%).

Respiratory problems (38.0%) and neonatal jaundice (44.0%) were observed in a portion of the children, while birth injuries were rare (1.0%). Most had a normal fetal presentation at birth (95.0%), good sleeping patterns (70.0%), and good feeding habits (89.0%). Additionally, 56.0% had normal memory function, 39.0% had normal movement, and 34.0% exhibited normal speaking abilities.

Table (4): Association between (maternal health condition characteristics) and (oxygen treatment & congenital anomalies) in child outcome characteristics

Child outcome characteristics	Oxygen treatment				Congenital anomalies			
Maternal health condition characteristics	Exp(B)	95% C.I.for EXP(B)		P-value	Exp(B)	95% C.I.for EXP(B)		P-value
	Odds	Lower	Upper		Odds	Lower	Upper	
Mother age of this child	0.946	0.875	1.021	0.155	1.064	0.986	1.149	0.112
Mother BMI	1.624	0.731	3.608	0.233	1.987	0.820	4.813	0.128
Consanguineous	0.298	0.087	1.025	0.055	0.538	0.165	1.752	0.304
Mother utilization of health service	1.928	0.290	12.833	0.497	15.996	1.149	222.703	0.039
child death	0.232	0.042	1.297	0.096	0.611	0.105	3.544	0.583
Abortion	1.546	0.926	2.579	0.096	1.268	0.764	2.105	0.359
folic acid use during pregnancy	4.723	1.207	18.478	0.026	0.898	0.254	3.171	0.867
Folic acid use before pre.	1.085	0.243	4.854	0.915	0.365	0.049	2.739	0.327
Stress	1.811	0.522	6.276	0.349	0.446	0.093	2.144	0.313
renal problem	17.712	0.666	471.279	0.086	1.056	0.069	16.132	0.969
MD	0.031	0.002	0.607	0.022	0.196	0.011	3.441	0.265
Hypertension	9.971	0.896	110.957	0.061	15.790	1.068	233.438	0.045
Anemia	0.439	0.193	0.996	0.049	0.936	0.442	1.979	0.862
age of mother in primigravida	1.079	0.332	3.505	0.900	0.338	0.094	1.209	0.095
previous c\s	1.020	0.628	1.657	0.937	0.821	0.496	1.360	0.445

Table (4): shows the association between (maternal health condition characteristics) and (oxygen treatment & congenital anomalies) in child outcome characteristics.

The result of the study indicates, that there is a statistically significant difference (or association) between the child's oxygen needs during birth and the mother utilizing folic acid during pregnancy, and diabetes mellitus because the result of the p-value was less than the common alpha 0.05.

Regarding (congenital anomalies). A statistically significant difference (or association) was found between the child's congenital anomalies and the mother's utilization of health service, Hypertension of mothers because the result of the p-value was less than the common alpha 0.05.

Table (5): Association between (Maternal health condition characteristics) and (NICU admission & respiratory problem) in child outcome characteristics

Child outcome characteristics	NICU Admission				Respiratory problem			
Maternal health condition characteristics	Exp(B)	95% C.I.for EXP(B)		P-value	Exp(B)	95% C.I.for EXP(B)		P-value
	Odds	Lower	Upper		Odds	Lower	Upper	
Mother age of this child	0.999	0.928	1.074	0.969	0.908	0.838	0.984	0.019
Mother BMI	1.367	0.635	2.941	0.424	0.846	0.377	1.899	0.685
Consanguineous	0.370	0.115	1.188	0.095	0.624	0.202	1.934	0.414
Mother utilization of health service	2.958	0.458	19.117	0.255	1.038	0.138	7.794	0.971
child death	0.859	0.180	4.098	0.849	0.151	0.023	1.006	0.051
Abortion	1.391	0.845	2.290	0.195	1.764	1.039	2.996	0.036
folic acid use during pregnancy	2.382	0.714	7.948	0.158	2.324	0.657	8.222	0.191
Folic acid use before pregnancy.	2.039	0.449	9.260	0.356	0.465	0.097	2.237	0.339
Stress	1.753	0.539	5.696	0.351	1.350	0.358	5.087	0.658
renal problem	15.374	0.519	455.199	0.114	0.675	0.278	1.782	0.998
DM	0.009	0.000	0.231	0.005	0.665	0.371	1.682	0.990
Hypertension	3.815	0.334	43.524	0.281	0.671	0.291	1.672	0.980
Anemia	0.368	0.158	0.856	0.02	0.551	0.255	1.192	0.130
Gestational age	0.070	0.014	0.345	0.001	0.322	0.075	1.388	0.129
age of mother in primigravida	1.249	0.405	3.849	0.699	0.435	0.122	1.545	0.198
previous c\s	0.919	0.576	1.468	0.724	1.245	0.786	1.972	0.351

Table (5): shows the association between (the maternal mother's health condition) and (the NICU & respiratory problem) in child outcomes.

The result of the study indicates that there are statistically significant differences (or association) between (NICU admission) of child outcome characteristics in relation to Mother (DM, Anemia) because the result of the p-value was less than the common alpha 0.05. Regarding (respiratory problem). There is a statistically significant difference (or association) between (respiratory problems) and the mother's age for this child and Abortion), because the result of the p-value was less than the common alpha 0.05.

Table (6): Association between (maternal health condition characteristics) and (neonatal jaundice) in child outcome characteristics

Child outcome characteristics	Neonatal jaundice				Child's health problems (outcomes)			
maternal health condition characteristics	Exp(B)	95% C.I.for EXP(B)		P-value	Exp(B)	95% C.I.for EXP(B)		P-value
	Odds	Lower	Upper		Odds	Lower	Upper	
Mother age of this child	1.166	0.622	2.185	0.632	0.801	0.221	1.382	0.007
Mother BMI	0.941	0.475	1.863	0.861	0.035	0.029	0.581	0.898
Consanguineous	0.530	0.190	1.482	0.226	1.450	0.558	2.342	0.001
Mother utilization of health service	1.382	0.272	7.020	0.697	1.329	0.061	2.719	0.061
child death	1.371	0.326	5.765	0.667	0.261	0.178	1.370	0.645
Abortion	0.694	0.441	1.091	0.114	0.190	0.453	0.272	0.625
folic acid use during pregnancy	1.878	0.625	5.645	0.262	0.736	0.649	0.936	0.938
Folic acid use before pre.	1.491	0.386	5.756	0.562	0.769	0.383	1.921	0.191
Stress	1.313	0.427	4.037	0.635	0.265	0.185	1.215	0.584
renal problem	5.162	0.429	62.041	0.196	0.553	0.478	2.580	0.594
DM	1.950	0.291	13.069	0.491	2.365	0.718	4.012	0.005
Hypertension	0.910	0.133	6.226	0.923	1.289	0.462	3.040	0.149
Anemia	1.072	0.581	1.980	0.823	0.108	0.095	0.611	0.775
Gestational age	0.389	0.122	1.238	0.110	0.125	0.103	0.173	0.745
age of mother in primigravida	0.315	0.105	0.947	0.040	1.146	0.232	2.524	0.103
previous c\s	1.063	0.696	1.625	0.777	2.660	0.094	3.627	0.148

Table (6): shows the Association between (maternal health conditions) and (neonatal jaundice & Diagnosis). The result of the study indicates that there are statistically significant differences (or associations) between (neonatal jaundice) related to (age of the mother in primigravida) because the result of the p-value was less than the common alpha 0.05.

Regarding the child's health outcomes, there are statistically significant differences (or association) between (the child's health outcomes,) and the mother's age for this child, Consanguineous and DM) of the mother's health conditions, because the result of the p-value was less than the common alpha 0.05.

DISCUSSION

This study examined the sociodemographic and health characteristics of mothers alongside child health outcomes, exploring potential associations with neonatal conditions such as oxygen treatment needs and congenital anomalies.

The findings indicate that the majority of mothers were between 35–45 years, with a mean age of 42.7 years. Advanced maternal age has been associated with increased risks of chromosomal anomalies and obstetric complications, aligning with prior studies linking delayed childbearing to higher incidences of preterm birth and low birth weight [6-8].

Educational levels also played a critical role, with over a quarter of mothers holding higher education degrees. Higher education is associated with improved health literacy, influencing antenatal care utilization and neonatal outcomes [9]. This finding aligns with a previous study emphasizing the role of education in facilitating informed health decisions and better maternal health service utilization [10,11].

Regarding occupation, 47% of mothers were housewives. This distribution underscores gendered occupational roles that may impact access to healthcare services. Higher maternal education was positively linked with better maternal healthcare service utilization, a pattern supported by existing research [10,11].

The study found that most mothers were overweight, with a mean BMI of 27.92. Overweight and obesity in pregnancy are associated with adverse perinatal outcomes, including increased risks of congenital anomalies and cesarean section [12-14]. More than half of the mothers underwent cesarean sections, a rate notably higher than global averages (20%–30%), potentially reflecting medical indications or cultural preferences [13].

Folic acid supplementation during pregnancy was significantly associated with reduced neonatal oxygen dependency (p=0.026). Prior research supports this association, emphasizing folic acid's role in fetal development and neural tube defect prevention [15,16]. However, low pre-pregnancy folic acid use suggests a gap in preconception education, highlighting the need for targeted health interventions.

Maternal hypertension, though reported in a small number of cases, was significantly associated with congenital anomalies (p=0.045). Hypertension in pregnancy, including pre-eclampsia, has been widely recognized as a risk factor for fetal growth restriction and congenital abnormalities [17,18]. These findings align with studies demonstrating how hypertensive disorders impair placental function, leading to adverse neonatal outcomes.

The majority of children were male with a significant portion admitted to NICU. Notably, more than a quarter of children had Down syndrome, and 30% were diagnosed with autism, indicating a high prevalence of neurodevelopmental disorders. A significant proportion of neonates required NICU admission (43%). Advanced maternal age and maternal health conditions such as diabetes and hypertension were associated with a higher prevalence of congenital anomalies and neurodevelopmental disorders, including Down syndrome (26%) and autism (30%). These findings are consistent with studies showing that older maternal age increases the likelihood of chromosomal abnormalities and neurodevelopmental conditions [19-21].

Behavioral outcomes were generally positive, with most children demonstrating good behavior and 75% reporting good sleeping patterns. Previous studies have suggested that early interventions and supportive home environments significantly contribute to these favorable outcomes [20].

The association between maternal obesity and specific child health outcomes was not statistically significant in this study. However, previous research has established maternal obesity as a contributing factor to congenital anomalies, preterm birth, and neurodevelopmental disorders [26]. This discrepancy may be due to sample size limitations or other unmeasured confounding factors.

Folic acid supplementation showed a protective effect, significantly reducing neonatal oxygen needs (p=0.026). Prior meta-analyses have demonstrated that folic acid use before and during pregnancy reduces neural tube defects by 60-70% [16]. These findings reinforce recommendations for improving folic acid awareness and supplementation, particularly in populations at risk for neural tube defects.

NICU admissions were significantly associated with maternal health conditions, including obesity and hypertension. Studies report that maternal complications contribute to approximately 40% of NICU admissions, with gestational diabetes and hypertensive disorders directly increasing neonatal risks [23].

The findings align with previous research on advanced maternal age and increased risks of congenital anomalies and neurodevelopmental disorders [7,21]. Similarly, the association between maternal hypertension and congenital anomalies is supported by studies emphasizing the impact of hypertensive disorders on fetal development [17,18]. The significant effect of folic acid supplementation on neonatal respiratory outcomes corroborates previous evidence on its role in fetal lung and neural development [16-25].

While the study did not find a direct statistical association between maternal obesity and specific child health outcomes, existing literature consistently identifies obesity as a major risk factor for adverse neonatal outcomes [26,27]. This suggests the need for further research with larger sample sizes to clarify these relationships.

This study highlights the critical influence of maternal socio-demographic and health characteristics on neonatal and child health outcomes. Interventions focusing on preconception counseling, weight management, and hypertension control are essential. Additionally, improving antenatal care quality and promoting early folic acid supplementation could significantly enhance neonatal outcomes. Future research should incorporate longitudinal studies to establish causal relationships and further investigate maternal obesity's impact on child health.

CONCLUSION

This study highlights the critical influence of maternal socio-demographic and health characteristics on neonatal and child health outcomes. Interventions focusing on preconception counseling, weight management, and hypertension control are essential. Additionally, improving antenatal care quality and promoting early folic acid supplementation could significantly enhance neonatal outcomes. Future research should incorporate longitudinal studies to establish causal relationships and further investigate maternal obesity's impact on child health.

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Conflict of Interest

The authors declare no conflicts of interest related to this study.

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Authors' Contributions

All authors contributed significantly to the study's conception, design, data collection, analysis, and manuscript preparation. All authors have read and approved the final manuscript.

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