



Study of the Association between the economic conditions of households and the severity of perinatal asphyxia at the National Reference Center for Neonatology and Nutrition of Rabat

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Abstract

Objective of this work: is related the influence of economic conditions of households on the severity of perinatal asphyxia.

Materials and Methods: this is a 24-month retrospective study, it was conducted at the National Reference Center for Neonatology and Nutrition at the Children's Hospital of University Hospital Center of Rabat, and it involved all newborns admitted with a diagnosis of perinatal asphyxia, regardless of their origin.

Results: 568 asphyxial neonates were collected from 7265 hospitalizations during the 2015-2016 period. With a response rate of 84.51%, this study demonstrated that the severity of perinatal asphyxia is influenced by several factors including in this study; household income (P = 0.004); the type of medical coverage (P = 0.005); the professional activity of the head of household (< 0.001);

the professional activity of the mother (P = 0.001); the number of prenatal consultations performed during pregnancy (P = 0.032); and the pregnancy monitoring structure (P = 0.003).

Conclusion: Associations attested between economic conditions of households and severity of perinatal asphyxia demonstrate the importance of considering all these variables in support of mother-newborn couples to act positively on reducing the prevalence of perinatal asphyxia and consequently participate in the reduction of neonatal morbidity and mortality.

Key words: Perinatal asphyxia, economic conditions, households, income, healthcare expenses, medical coverage, professional activity, prenatal consultation.

Introduction

Compared with developed countries, developing countries have very high neonatal mortality rates; 3 deaths per 1000

live births for developed countries compared with 21 deaths per 1000 live births for developing countries [1]. According to statements of the World Health Organization, 4 million newborns die before the age of one month, two-thirds of them during the first week of life. This mortality is recorded more specifically in developing countries [2]. Thus, the Millennium Development Goal, drawn up for 2015 in this area, has not been achieved, to be taken in the context of Sustainable Development Objectives with a goal to reach by 2030 neonatal mortality of 12 per 1000 live births in all countries of the world.

Certainly that developing countries have taken actions whose implementation is likely to face this problem. But neonatal mortality continues to ravage a considerable number of newborns in these countries; for example, India has 28 deaths per 1,000 live births, Niger 34 deaths per 1,000 live births, Mali 38 deaths per 1,000 live births, Mauritania 36 deaths per 1,000 live births. [1].

Faced with this picture, by subscribing to the Millennium Development Goals, Morocco pledged to reduce infant mortality by two-thirds by 2015 and has since led an arsenal of action whose main goal is the success of this commitment. Nevertheless, neonatal mortality is still a real health problem in Morocco. It is displayed with a very high rate of 18 deaths per 1000 live births in 2015 [5]. And it accounts for three quarters of deaths under one year (77.5% in urban and 73.7% in rural) [3].

Since the vulnerability of the child, future social and economic actor of his country, already begins within his mother [4]. Achieving studies around the perinatal period is of great importance, in a vision to address health problems that affect newborns. In fact, one of the key recommendations of the 2012-2016 action plan, to accelerate the reduction of maternal and neonatal mortality, is the need for research in the area of neonatal health [5].

According to the health figure of 2014, the causes of neonatal mortality in Morocco are mainly prematurity, neonatal asphyxia, and infection [6]. This ranking according to the degree of importance does not coincide with the situation at the global and African level. Perinatal asphyxia is the third leading cause of neonatal mortality worldwide, with the exception of Morocco where it is the second leading cause of neonatal mortality and morbidity. Conscious of the morbid burden of perinatal asphyxia, and since accelerating the reduction of perinatal mortality can be guaranteed by concentrating investigations on perinatal asphyxia [7]. Conducting studies on the asphyxia of newborns is of great importance, in order to reduce neonatal mortality and consequently the mortality of children under five in Morocco, without forgetting the achievement of the Development Objectives sustainable.

Because Thérèse Biselele, by analyzing more than 170 studies and articles carried out on this pathology, has shown that these studies embrace only the medical side, in the absence of an elucidation of the socio-economic determinants of health [7]. This study aims to highlight the possible influences of household economic conditions on the severity of perinatal asphyxia at the National Center for Reference in Neonatology and Nutrition of Rabat.

1. Patients and methods

1.1 The place of the study

We conducted our study at the Reference Center in Neonatology and Nutrition of Rabat. It is the largest center of the five existing neonatology centers at the national level. This center is a regional and supraregional reference structure for neonatal pathology. It covers an estimated population of 7737941 people, about 23% of the total population of Morocco and 1734905 families [1].

1.2 Patients

1.2.1 Inclusion criteria

This is a retrospective study of newborns admitted to the National Reference Center for Neonatology and Nutrition

with a diagnosis of perinatal asphyxia during the 2015-2016 period, regardless of gender and origin.

1.2.2 Exclusion criteria

We excluded from the study, asphyxia neonates with an associated pathology, newborns whose families refused to participate in the study, and neonates whose parents participated in the testing of the tools collection of data used in the study.

1.3 Data collection

Data on medical information, the degree of perinatal asphyxia, were collected from hospital files of recruited newborns. To have the economic data of households, such; household income, medical coverage, work activity, and access to antenatal care, a mixed individual questionnaire was used.

1.4 Ethical considerations

The Ethics Committee of the Faculty of Medicine and Pharmacy of Rabat and the administration of the National Reference Center for Neonatology and Nutrition have agreed to carry out this study. Respect for anonymity and rules of confidentiality of information has been respected. Informed consent was obtained from each head of household at the time of entry into the study. And participation in the study was for free.

1.5 Some definitions

1.5.1 Severity of perinatal asphyxia

According to the classification of SARNAT and SARNAT, perinatal asphyxia is classified in three degrees, normal state, moderate encephalopathy and severe encephalopathy.

1.5.2 Household

According to the definition of the High Commissioner for Planning, the household is a group of individuals living in the same dwelling and having common expenses [8]. This study used this definition during the survey.

1.5.3 Revenue

By adopting the monoculture adopted by the Office of the High Commissioner for Planning, the household income is analyzed in this study according to six categories. Category from 0 to 499 DH, category from 500DH to 1999DH, category from 2000DH to 2999DH, category from 3000DH to 4999DH, category from 5000DH to 9999DH and category from 10000DH to 19999DH. To calculate the household income, we took into consideration all the incomes of the active members of this household.

1.5.4 Care Spending

Health care expenditures refer to the sum of household care expenditures during the prenatal period to monitor pregnancy, childbirth and postnatal care.

1.5.5 Type of medical coverage

Medical coverage is classified into four types. The National Social Security Fund (CNSS), the National Fund for Social Welfare Organizations (CNOPS), the Medical Assistance Plan for the Economically Deprived (RAMED), and private insurance company.

1.5.6 Professional activity

To study the professional activity of the head of the household and the mother, this study referred to the monoculture of the adopted by the High Commissioner for Planning. As a result, six categories are considered; senior managers; middle managers; the employees; craftsmen; workers in small trades; and unemployed people. For mothers with a professional activity, we studied the time needed to go to work, the work environment, the number of hours of work, and the stance adopted during work.

1.5.7 Prenatal consultation

Access to prenatal care is studied by analyzing, among other things, the number of prenatal consultations carried out during pregnancy, the duration of the appointment to benefit from prenatal consultation, the structure of pregnancy monitoring, the duration of expectation at the

level of the care structure before benefiting from consultation, and the completion of ultrasound and biological examinations during gestation.

1.6 Statistical Analysis

The data were imported into an Excel file and then transferred to the SPSS V20 software. The qualitative variables were compared by the Pearson Chi2 test and the comparison of the means of the quantitative variables was done by the Student's test. The results are reported as numbers with the corresponding percentages or on average \pm standard deviation. P values below 0.05 were considered statistically significant.

2. Results

480 asphyxic neonates were included in this study to analyze the influence of household social conditions on the severity of perinatal asphyxia at the National Reference Center for Neonatology and Nutrition of Rabat.

2.1. Flow Chart of the study

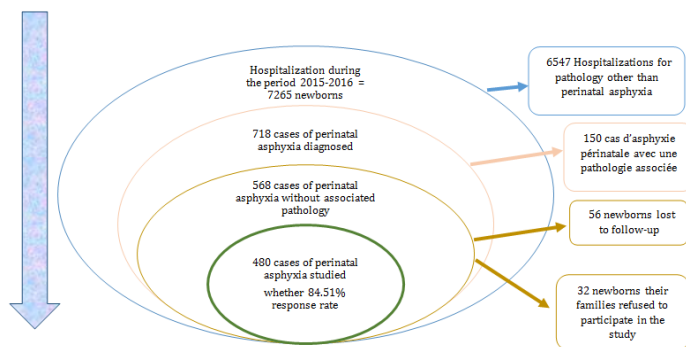


Figure 1: Summary of the flow of newborns participating in the study.

2.2 Household economic characteristics of asphyxial newborns

The results of the study of the household economic characteristics of the 480 asphyxial newborns included in this study showed that the average income of these households was 3328.31HD \pm 2449.57DH. 28.33% of respondents reported a income which varies between [500 DH, 1999 DH], and 0.83% an income between [10000 DH, 19999 DH]. 81.67% of households did not spend

money during the prenatal period, or 392 cases. In the case of 88 households with expenditures the average amount of expenditure made was 1180.68DH \pm 781.08DH, 57.95% reported expenditures between [500DH, 1000 DH], and 1.14% made expenses of more than 5000 DH. 82.29% of households had medical coverage, or 395 households. The type of this medical coverage was 54,68% the RAMED, 36,20% the CNSS, 6,58% the CNOPS, and 2,53% the private insurance company. 60.51 of households with medical coverage stated that it does not cover the cost of care for asphyxiated newborns. The head of household was classified as small trades workers in 50.83% of cases, as employees in 19.38% of cases, and as senior managers in 2.29% of cases. 16.4% of the mothers have a professional activity, ie 79 mothers included in this study. These mothers are classified as senior managers in 1.27% of the cases, as employed in 39.24% of the cases, and as workers in the small trades in 46.84% of the cases. The average time required for these mothers to get to work is 21.65 min \pm 12.22 min. 60.76% of the mothers needed between [10min, 20min] to get to work, and 24.05% needed [30min, 40min].

Table 1. Household economic characteristics of asphyxial newborns

variables	Asphyxial neonates N = 480	
	Effective	Percentage (%)
Household income (mean ± SD)	3328,31DH ± 2449,57DH	
Household income		
[0Dh, 499DH]	29	6,04
[500DH, 1999DH]	136	28,33
[2000DH, 2999DH]	149	31,04
[3000DH, 4999DH]	85	17,71
[5000DH, 9999DH]	77	16,04
[10000DH, 19999DH]	4	0,83
Expenditures during the prenatal period		
No	392	81,67
Yes	88	18,33
Sum of expenditure made (mean ± SD)	1180,68DH ± 781,08DH	
Sum of expenses made		
[500DH, 1000 DH]	51	57,95
[1000DH, 2000DH]	11	12,5
[2000 DH, 5000DH]	25	28,41
>5000 DH	1	1,14
Presence of medical coverage		
Yes	395	82,29
No	85	17,71
Type of cover		
CNSS	143	36,20
CNOPS	26	6,58
RAMED	216	54,68
Private insurance company	10	2,53
Health care coverage		
Yes	156	39,49
No	239	60,51
The professional activity of the head of household		
senior managers	11	2,29
Middle managers	45	9,37
Employees	93	19,38
Crafts	52	10,83

Small trades workers	244	50,83
Unemployed person	35	7,29
Professional activity of mother		
Yes	79	16,4
No	401	83,5
Type of professional activity of mother		
senior managers	1	1,27
Middle managers	10	12,66
Employees	31	39,24
Women workers in small trades	37	46,84
Time needed to get to work (mean ± SD)	21,65 min ± 12,22 min	
Time needed to get to work		
<10min	1	1,26
[10min, 20 min]	48	60,76
[20min, 30 min]	6	7,59
[30min, 40 min]	19	24,05
[40min, 49 min]	5	6,33

2.3 The stages of severity of perinatal asphyxia recorded

The analysis in Table 2 shows that the condition of the newborn who had perinatal asphyxia is three degrees, Normal, (Perinatal asphyxia I (SNNI), 19.8%), moderate encephalopathy, (SNN II, 38, 75%), and severe encephalopathy (SNNIII, 41.45%).

Table 2. Stages of severity of perinatal asphyxia recorded.

Degrees of perinatal asphyxia	Newborn asphyxia N = 480	
	Effective	Percentage (%)
SNNI	95	19,8
SNNII	186	38,75
SNNIII	199	41,45

2.4 Association between the economic conditions of households and the stages of severity of perinatal asphyxia

According to the results reported in Table 3, there are associations between certain economic conditions, households, included in this study and the severity of perinatal asphyxia. These conditions are: household income (0.004), sum of perinatal care expenditures (0.005), type of medical coverage (0.005), perinatal care coverage (0.002), and professional activity of head of household (<0.001).

Table 3. Associations between the severity of perinatal asphyxia and household economic conditions

	SNNI (n=95)	SNNII (n=186)	SNNIII (n=199)	P-value
Household income				
[0Dh, 499DH]	0	10 (5,38%)	19 (9,55%)	
[500DH, 1999DH]	8 (8,42%)	62 (33,33%)	66(33,16%)	
[2000DH, 2999DH]	30 (31,58%)	57 (30,63%)	62 (31,15%)	0,004
[3000DH, 4999DH]	21 (22,10%)	32 (17,2%)	32 (16,08%)	
[5000DH, 9999DH]	36 (37,89%)	21 (11,29%)	20 (10,05%)	
[10000DH, 19999DH]	0	4 (2,15%)	0	
Expenditures during the perinatal period				
No	81 (85,26%)	148 (79,57%)	163 (81,91%)	0,166
Yes	14 (14,74%)	38 (20,43%)	36 (18,09%)	
Sum of expenses made				
[500DH, 1000DH]	0	20 (52,63%)	31 (86, 11%)	
[1000DH, 2000DH]	0	6 (15,79%)	5 (13,89%)	
[2000DH, 5000DH]	14 (100%)	11 (28,95%)	0	0,005
>5000 DH	0	1 (2,63%)	0	
Type of medical coverage				
CNSS	72 (75,79%)	44 (27,5%)	27 (19,28%)	
CNOPS	10 (10,53%)	8 (5%)	8 (5,72%)	0,005
RAMED	08 (8,42%)	103 (64,37%)	105 (75%)	
Private insurance company	05 (5,26%)	5 (3,12%)	0	
Perinatal care coverage				
Yes	60 (63,16%)	49 (30,63%)	47 (33,57%)	0,002
No	35 (36,84%)	111 (69,38%)	93 (66,42%)	
The professional activity of the head of household				
Cadres supérieurs	10 (10,52%)	0	1 (0,5%)	
Middle managers	21 (22,10%)	14 (7,53%)	10 (5,02%)	
Employees	12 (12,63%)	48 (25,81%)	33 (16,58%)	
Crafts	11 (11,57%)	11 (5,91%)	30 (15,07%)	
Small trades workers	41 (43,15%)	102 (54,84%)	101 (50,75%)	<0,001
Unemployed person	0	11 (5,91%)	24 (12,06%)	

Table 4 presents the associations between the mother's work and the severity of perinatal asphyxia. The aspects of the mother's professional activity that influence the severity of perinatal asphyxia are: the type of work activity (0.001), the time required to get to work (0.001),

the mother's work environment (0.003), the number of hours of work per week (0.002), the position adopted by the mother during labor (0.005), and the posture in the case of the sitting position (0.001).

Table 4. The association between the mother's professional activity and the severity of perinatal asphyxia

	SNNI (n=06)	SNNII (n= 31)	SNNIII (n=42)	P-value
Type of mother's professional activity				
Senior managers	0	0	1 (2,38%)	0,001
Middle managers	0	6 (19,35%)	4 (9,52%)	
Employees	1 (16,67%)	13 (41,94%)	17 (40,48%)	
Women workers in small trades	5 (83,33%)	12 (38,71%)	20 (47,61%)	
Time needed to get to work				
<10min	0	1 (3,23%)	0	0,001
[10min, 20 min]	6 (100%)	19 (61,29%)	23 (54,76%)	
[20min, 30 min]	0	4 (12,9%)	2 (4,76%)	
[30min, 40 min]	0	7 (22,58%)	12 (28,57%)	
[40min, 49 min]	0	0	5 (11,90%)	
Work environment of the mother				
Intense noise	4 (66,67%)	18 (58,06%)	5 (11,9%)	0,003
Use of chemicals	0	1 (3,23%)	4 (9,52%)	
Irregular or unpredictable work schedule	2 (33,33%)	12 (38,71%)	12 (28,57%)	
Night work schedule	0	0	8 (19,05%)	
Handling heavy loads	0	0	13 (30,95%)	
Number of hours of work per week				
[20h/w, 40h/w]	0	3 (9,68%)	4 (9,52%)	0,002
40h/w	5 (83,33 %)	0	0	
>40h/w	1 (16,67%)	28 (90,32%)	38 (90,48%)	
Position adopted during the work				
Especially standing	0	10 (32,26%)	18 (42,86%)	0,005
Mostly seated	6 (100%)	12 (38,71%)	17 (40,48%)	
Alternation between the two positions	0	9 (29,03%)	7 (16,67%)	
Posture in the case of standing				
Standing posture fixed without possibility of moving	0	8 (80%)	8 (44,45%)	0,082

Standing posture with displacements	0	2 (20%)	8 (44,45%)	
Standing posture with opportunities to sit down at will	0	0	2 (11,1%)	
Posture in the case of the sitting position				
Fixed sitting posture without possibility of moving	4 (66,67%)	7 (58,33%)	14 (82,35%)	
Sitting posture with occasional lift	2 (33,33%)	5 (41,66%)	3 (17,65%)	0,001
Sitting posture with the possibility to get up at will	0	0	0	

Table 5 shows the association between the number of prenatal consultations carried during pregnancy by mothers of newborn asphyxia included in this study and the severity of perinatal asphyxia. The P-value of this association is 0.032.

Table 5. The association between the number of prenatal visits and the severity of perinatal asphyxia

	SNNI (n=95)	SNNII (n=186)	SNNIII (n=199)	P-value
Number of prenatal consultations carried during pregnancy				
No consultation	16 (16,84%)	57 (30,65%)	55 (27,64%)	
1 consultation	1 (1,05%)	4 (2,15%)	0	
2 consultations	0	9 (4,84%)	5 (2,51%)	0,032
3 consultations	17 (17,89%)	20 (10,75%)	26 (13,07%)	
4 consultations	43 (45,26%)	59 (31,72%)	69 (34,67%)	
5 consultations	9 (9,47%)	24 (12,9%)	13 (6,53%)	
> 5 consultations	9 (9,47%)	13 (9,99%)	31 (15,58%)	

As related in Table 6, 89.77% of mothers of asphyxial newborns follow their pregnancy have made an appointment for the first prenatal visit; or 316 women.

Table 6. Making an appointment to consult

during the prenatal period

	Effective	Percentage
		(%)
Make appointments to consult		
Yes	316	89,77
No	36	10,23

The croisement results presented in Table 7 shows that the term of appointment to benefit from the first prenatal

visit influences the severity of perinatal asphyxia. The P-value of this association is 0.001.

Table 7. The association between duration of made an appointment to receive a prenatal visit and severity of perinatal asphyxia

	SNNI (n=68)	SNNII (n=113)	SNNIII (n=135)	P-value
Duration of the appointment to benefit from the first prenatal consultation				
1 day	1 (1,47%)	0	2 (1,48%)	0,001
[1day, 1 week]	18 (26,47%)	46 (40,71%)	72 (53,33%)	
[1 week, 1 month]	49 (72,05%)	67 (59,29%)	61 (45,19%)	

Table 8 shows the associations between the characteristics of prenatal consultations carried by mothers of asphyxial newborns included in this study and the severity of perinatal asphyxia. According to this table, the characteristics that influence the pregnancy are: the pregnancy monitoring structure (0.003), the time required

to get to these structures (0.005), the means of transport used to get to these structures (0.004), waiting time at the prenatal consultation structure level (0.002), performing ultrasound examinations during prenatal consultation (0.001), and performing biological examinations during pregnancy (0.001).

Table 8. The association between prenatal care and the severity of perinatal asphyxia

	SNNI (n=79)	SNNII (n=129)	SNNIII (n=144)	P-value
Structure of pregnancy monitoring				
At a specialist doctor in a public care	9 (11,39%)	8 (6,20%)	7 (4,86%)	
At a specialist doctor in a cabinet	29 (36,71%)	17(13,18%)	8 (5,56%)	0,003
At a specialist doctor in a clinic	6 (7,59%)	3 (2,33%)	0	
At a general practitioner's office	11 (13,92%)	13(10,08%)	21 (14,58%)	
At a midwife in a health center	24 (30,38%)	88 (68,22%)	108 (75%)	

Time required to reach the prenatal consultation structure

<10min	25 (31,65%)	21 (16,28%)	14 (9,22%)	
[10min, 20 min [	46 (58,23%)	90 (69,77%)	91 (63,19%)	
[20min, 30 min [	8 (10,12%)	17 (13,18%)	30 (20,83%)	0,005
[30min, 40 min [	0	0	4 (2,78%)	
[40min, 50 min]	0	0	5 (3,47%)	
>1h	0	1 (0,77%)	0	

Mode of transportation used to get to the prenatal consultation structure

None	25 (31,65%)	60 (46,51%)	64 (44,44%)	
Motorcycle	0	1 (0,78%)	0	0,004
Car	27(34,17%)	36 (27,91%)	26 (18,06%)	
Grand taxi	10 (12,66%)	15 (11,63%)	35 (24,31%)	
Small taxi	17 (21,52%)	17 (13,17%)	19 (13,19%)	

Waiting time at the prenatal consultation structure level

No waiting	38 (24,07%)	28 (21,70%)	25 (17,36%)	
10min	0	0	8 (5,56%)	
20min	5 (9,26%)	16 (12,4%)	17 (11,81%)	0,002
30min	8 (14,81%)	14 (10,85%)	14 (9,72%)	
40min	1 (1,85%)	11 (8,53%)	12 (8,33%)	
1h	5 (9,26%)	9 (6,98%)	13 (9,03%)	
>1h	22 (40,74%)	51 (39,53%)	55 (38,19%)	

Realization of ultrasound examinations during the prenatal consultation

Yes	48 (60,76%)	40 (31%)	36 (25%)	0,001
No	31 (39,24%)	89 (69%)	108 (75%)	

Ultrasound examination provider

Gynecological	38 (79,17%)	14 (35%)	29 (80,55%)	
General practitioner	10 (20,83%)	26 (65%)	7 (19,45%)	0,093
Midwife	0	0	0	

Performing biological examinations during pregnancy

Yes	37 (46,84%)	33 (25,58%)	28 (19,44%)	0,001
No	42 (53,16%)	96 (74,42%)	116 (80,56%)	

3. Discussion

The results of this study have demonstrated the existence of an influence between household economic conditions and the severity of neonatal asphyxia.

Household income is associated with the severity of perinatal asphyxia. This influence was expressed with a statistically significant P-value; 0.004. Corroborating the results of several studies, including: Ashford's study on the health gap between rich and poor [9]; the Black Report on the relationship between income and mortality in England and Wales [10]; Acheson's study on inequalities in mortality [11]; Ferrie's study on the relationship between disease risk and economic insecurity [12]; the Ahoey and Vodounou study on multidimensional poverty and child health [13]; and the Poder study on income inequality and early childhood development [14].

If household income is related to the severity of perinatal asphyxia, expenditure during the perinatal period was expressed with a P-value that is not statistically significant of 0.166. This result does not confirm the progress of the Niang study, which has commented on the relationship between the budget allocated to care and the state of health of family members [15].

Cornilleau's work on health growth and spending has shown that health spending influences the health status of the population and influences infant mortality rates [16]. To test this postulate, this research investigated the association between the sum of expenditures made during the perinatal period and the severity of perinatal asphyxia. To find a statistically significant association with P-value of 0.005. This corroborates the advances of Cornilleau.

To address the financial barriers to accessing appropriate care, the report of the World Health Organization / Europe has demonstrated the importance of providing medical coverage for the poorest [17]. Because the direct payments and the informal payments do not allow these last to

access the care of qualities and suitable. What generates, deteriorated health situations. This evidence was verified in this study, through the study of the association between the type of medical coverage and the severity of perinatal asphyxia, to find a statistically significant P-value of 0.005. To note that the ramedist families present 64.37% of the second degree of perinatal asphyxia; and 75% of the third degree of perinatal asphyxia. Demonstrating that, even with the presence of RAMEd as a diet addressed to the most deprived, the severity of perinatal asphyxia increases. Because 94.50 of the ramédistes declared that the system of the medical coverage which they have does not cover the medical interventions necessary for their asphyxic newborns.

The coverage of perinatal care is related to the severity of perinatal asphyxia; this correlation is represented with a P-value of 0.002. The non-coverage of perinatal care is expressed in 36.84% of the first degree of perinatal asphyxia, in 69.38% of the second degree of perinatal asphyxia, and in 66.42% of the third degree of perinatal asphyxia.

The professional activity of the household head is intimately associated with the severity of perinatal asphyxia. The P-value of this association is less than 0.001. Confirm the results; the study carried out by the Scientific Institute of Economic and Social Research on the influence of unemployment of head of the family on the living conditions of the household [18]; and Aïach's study on socio-occupational categories and mortality [19]. The professional activity of the mother is associated with the severity of perinatal asphyxia. This relationship is reported with a statistically significant P-value of 0.001. Corroborating the results; of Aïach's work on social inequalities in health between senior managers and laborers [19]; and Tapani Valkonen's work on number of years of study and mortality [20].

The time necessary for the mother to go to work in her association with the severity of perinatal asphyxia is represented with a P-value of 0.001; statistically significant. Affirming, therefore, the work of Aiach on the causes of differential mortality between socio-professional categories [19].

The association between the mother's work environment and the severity of perinatal asphyxia is statistically significant and is represented with a P-value of 0.003. Asserting the results of Aiach's work on the existing hierarchy between socio-occupational categories in terms of mortality and life [19].

The number of hours of work per week is associated with the severity of perinatal asphyxia. This relation is expressed with a significant P-value of 0.002. According to this study mothers who work more than 40 hours per week represent; 90.48% of the third degree of perinatal asphyxia; 90.32% of the second degree of perinatal asphyxia; and 16.67% of the first degree of perinatal asphyxia. Corroborating the results of Aiach's work on the existing hierarchy between socio-professional categories in terms of mortality and life [19].

The position of women at work in association with the severity of perinatal asphyxia presented with a significant P-value of 0.005. Indeed, the alternation between sitting and standing poses only 0% of the first degree of perinatal asphyxia, 29.03% of the second degree of perinatal asphyxia, 16.67% of the third degree of perinatal asphyxia. Attesting the results of Aiach in his study on social morbidity [19].

Postural standing is not statistically significant in relation to the severity of perinatal asphyxia. This relationship was expressed with a P-value of 0.082. Inhibit the results of Aiach in his study on social morbidity [19]. However, posture in the case of sitting is associated with the severity of perinatal asphyxia. And this influence is expressed with a significant P-value of 0.001. Indeed, sitting posture with

the ability to get up at will is reported in 0% of the first, second, and third degree of perinatal asphyxia. Confirming the findings of Aiach in his studies on the existing hierarchy between the socio-occupational categories in terms of mortality and life, and on the medical use of French people and their health [19].

The number of prenatal consultations carried during pregnancy is associated with the severity of perinatal asphyxia. This relation is advanced with a P-value of 0.032. Corroborating the results of several studies, including; the survey of the High Commissioner for Planning on the socio-economic conditions of women in Morocco [21]; Fleurbaey's study on women's health in Canada [22]; the study by Abihjit Banerjee and Esther Duflo on the causalities and correlations between poverty, access to care and health [23]; and Aiach's book titled *Social Inequalities in Health* [19].

The duration of the appointment for the first prenatal consultation is in association with the severity of perinatal asphyxia. This relation is reported with a statistically significant P-value; P-value of 0.001. In addition, the time required to reach the prenatal clinic structure has a significant relationship with the severity of perinatal asphyxia. This relation is expressed with a statistically significant P-value of 0.005. Masseria, in her study on inequalities in access to care and health status, demonstrated the importance of focusing not only on the importance of access to care to improve the health status of individuals but also on the quality of care provided to individuals [24]. According to Zeynep and Laure among the criteria for assessing the quality of care, it is appropriate to mention; the duration of the Rendez-vous for a medical consultation and the time needed to access the health care facilities [25]. Therefore, the results of this study demonstrate the advanced study of Masseria.

The pregnancy monitoring structure is also associated with the severity of perinatal asphyxia. This influence is

expressed with a significant P-value of 0.003. Corroborating the results of Aïach's study on the consumption of specialized medicine and the state of health of socio-professional classes [19].

The means of transportation used to reach the antenatal clinic structure expressed a statistically significant association with the severity of perinatal asphyxia; with a P-value of 0.004. Confirming the results of Brenneman's work linking the means used to access health care facilities with patient health [26].

The waiting time at the prenatal consultation structure is associated with the severity of perinatal asphyxia. This relationship is reported with a statistically significant P-value of 0.002. Corroborating the results of the Masseria study, which considers waiting times as a determining factor in the quality of care provided to patients [24].

Ultrasound examinations during prenatal consultation are associated with the severity of perinatal asphyxia. This association is reported with a significant P-value of 0.001. In addition, the realization of biological examinations during pregnancy was associated with the severity of the perinatal asphyxia, with a statistically significant P-value of 0.001. Supporting the advanced Zeynep and Laure [25] and Masseria [24]. For these authors, the quality of care is crucial in the process of improving the health status of individuals. And as a decisive element of this quality, these authors have emphasized the treatment, in a fair way and according to the norms, of the patients who consult.

If the ultrasound examinations are in combination with the severity of the perinatal asphyxia, the ultrasound examination provider presents with a non-statistically significant P-value; 0.009. Thus invalidating the advances of Aïach in his study on the consumption of specialized medicine and the state of health of the socio-professional classes [19].

Conclusion

The survey carried out made it possible to highlight the existence of associations between the severity of perinatal asphyxia and the economic variables taken into consideration in this study. Variables deduced from a panoply of research and studies that have elucidated the socio-economic determinants of health in different contexts. Indeed, this research also allowed the discussion of the results.

All these results show the need to take action, the application will appease the influence of economic conditions of families on the prevalence of perinatal asphyxia in Morocco.

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Conflicts of interest

The authors stated that there are no competing interests.

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