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Health inequalities: child development in different social groups*

Desigualdades em saúde: o desenvolvimento infantil nos diferentes grupos sociais

Desigualdades en salud: el desarrollo infantil en los distintos grupos sociales

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ABSTRACT

Objective: To analyze child development in different social groups. **Method:** A cross-sectional study with children under 3 years old enrolled in basic health units of a municipality in the state of São Paulo, Brazil. Child development was verified by the Ministry of Health's Development Monitoring Form. The Social Class Index was used to classify families into social groups and the predefined hierarchical theoretical model for univariate and multiple logistic regression analysis. **Results:** The sample consisted of 348 children, in which 29% of the children presented the absence of some developmental milestone expected for their age, while social group and age group were associated with child development in the final model. Children from the least socially inserted groups aged 12 months or older were more likely to be missing some developmental milestone. **Conclusion:** The proportion of children with the absence of some developmental milestones is high and associated with lower social inclusion. The importance of developmental surveillance by the primary care nursing team is emphasized in order to identify the most vulnerable groups and to implement early interventions which can minimize the negative effects which worsen with age.

DESCRIPTORS

Child Development; Child Health; Health Status Disparities; Social Determinants of Health; Primary Care Nursing.

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INTRODUCTION

There has been substantial global progress in child survival, with a reduction of more than 40% in under-five mortality from 1990 to 2016[1]. In Brazil, such advances resulted from political, economic and demographic transformations which contributed to improving social conditions such as poverty level, urbanization, sanitation, women's education and fertility, all linked to the reorganization of the health system with increased access to healthcare and services, expanding the coverage of primary care health services and implementing actions to promote maternal and child health[2-3]. In this scenario, the new challenges include the care of children to promote healthy growth and development; conditions which, if not considered, affect health and future performance, with irreparable repercussions for society[4].

Monitoring development in primary healthcare with an observation roadmap is an essential action for early detection of children with development delay in achieving the expected milestones for age; a proposal that began in Brazil in the 1980s, although slowly[5]. However, despite policies and investments in programs and research, more than 40% of children in low- and middle-income countries are at risk of not achieving their development potential due to poverty and poor nutrition, health and environmental stimulation[6].

Studies in Brazil show a prevalence of 20% to 53% of child development (CD) delay[7-11], with higher risk among children from poorer families[7-9,11] with more than three siblings[7], born underweight[7,11], whose mothers had less than six prenatal appointments[9], who were not breastfed or received breast milk for less than 3 months[7], older[8], with nutritional risk[7], and with an absent father[11].

Despite the evidence that children from disadvantaged economic groups are those who most often experience developmental delay[7-9,11], it is difficult to explain the relationship between social inequality and CD problems, which are treated as a result of isolated factors, without considering the social-environmental conditions, meaning how the different social groups (SG) are linked to work and life processes[12-13]. Considering that there are few studies which investigate social inequality in health regarding this theoretical aspect, the objective of this study was to analyze CD in different SG based on the hypothesis that children from families with lower social insertion would have a higher chance of having problems with their health development.

METHOD

Study design

A cross-sectional, descriptive and analytical study with a quantitative approach, part of a broader investigation which evaluated the effect of nutritional counseling on eating practices, growth and development of children under 3 years of age, registered in basic health units (BHUs).

Population

The study was conducted from February to April 2013, in the city of Itupeva, São Paulo state, Brazil, in 12 BHUs which attended a total of 3,904 children under 3 years of age. The sample size calculation considered a 50% proportion of children with improper eating practice, 95% confidence level and 5% margin of error, thereby indicating the need for 350 children. The sample was representative and proportional to the total number of children registered in each BHU.

Selection criteria

Considering the objectives of the larger project, the inclusion criteria were: the child had to be registered at the BHU, under 3 years of age and accompanied by the biological mother for information on pregnancy, childbirth and the puerperium; and exclusion criteria: twins or children with metabolic syndromes, genetic and/or neurological problems, or sickle cell anemia. Of the 399 mothers approached, 358 comprised the sample (35 refusals, one not registered and five excluded). Thus, the sample for this study consisted of 348 children, as 10 interviews had some loss regarding the socioeconomic data, needed to compose the SG classification equation.

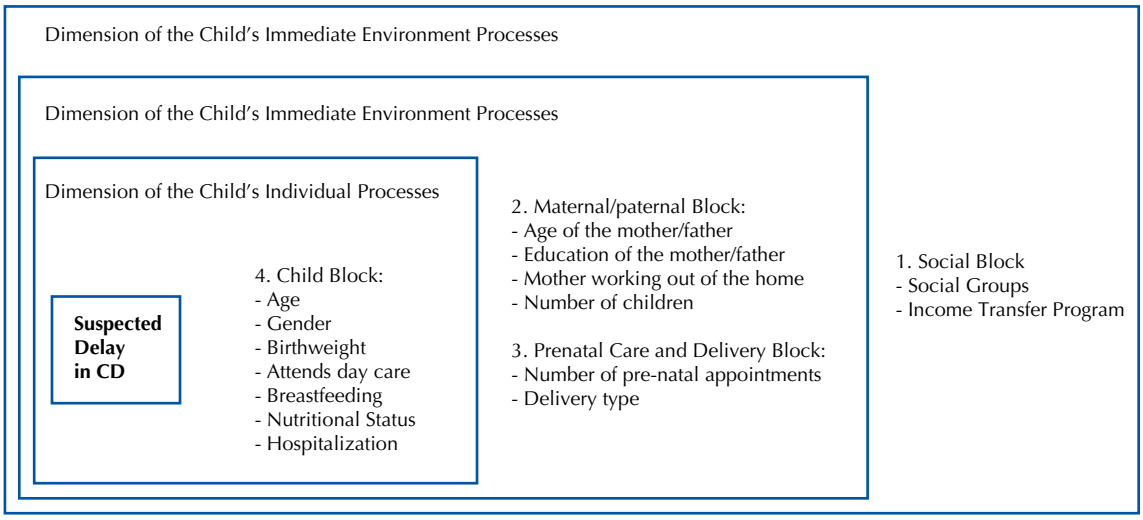
Data collection

Data were collected by 11 nurses and one nursing student, who were trained and supervised. The training was conducted in 2 days, and the supervision was performed weekly by a doctorate student and a post-doctorate student in nursing. The mothers were approached at the BHU and invited to participate; if they accepted, they were interviewed with a pretested instrument. Child Development was verified by the Development Monitoring Form proposed by the Ministry of Health[5], which refers to an observation roadmap for identifying children with "the presence of all child developmental milestones expected for age" or "the absence of some child developmental milestone (ACDM) expected for age". The Form is organized into 11 age groups corresponding to the recommended consultation periods for children aged 0 to 6 years old. The milestones were observed by the interviewers in the consultation room, with the presence of the mother. The interviewer requested and/or watched the child execute the proposed milestone for the age group, and the mother was consulted regarding the acquisition of a certain milestone when necessary. Children were grouped in presence of all expected age milestones, or ACDM when the child had no developmental milestone.

Data analysis and processing

Data were entered by double-typing in EpiInfo 6.04 software and exported to Stata 14.1 software. A univariate analysis was performed to analyze the association of ACDM and predictors, followed by multiple logistic regression, which included variables with $p<0.20$ in the

univariate analysis and control variables, with stepwise forward selection procedure applied to a theoretical model defined a priori, which respects a hierarchy that is considered to exist between the variables (Figure 1). In this conceptual model, the most distal socioeconomic variables have an effect on the intermediate level variables, which include the environmental, reproductive and healthcare variables, which together with the preceding variables affect the individual variables of the third level, such as: nutritional aspects (birth weight, current anthropometric measurements and diet) and history of morbidity[13]. This model was adapted to three hierarchical dimensions[14] and different variables in the present study: Dimension of Society's Structural Processes (Social Block); Dimension of the Child's Immediate Environment Processes (Maternal/paternal and Prenatal Care and Delivery Blocks); and Dimension of the Child's Individual Processes (Child Block).



Source: Adaptation from Victora et al.[14] and Silva et al.[15].

Figure 1 – Theoretical-hierarchical model of the variables associated with CD.

The SG variable was constructed from the Social Class Index, which classifies families into four SG according to equations which combine variables related to the ways of working (occupation qualification, activity condition, preparatory course for work and work registration card) and ways of living (property of residence, payment of property tax and urban land – *IPTU* (*Imposto Predial e Territorial Urbano*), number of bedrooms, access to sewage, access to running water and electricity, and religious worship as a leisure activity)[16].

We chose to work with three SG (SG1, SG2, SG3+4) in this study due to the low number of families classified as SG3 and proximity of characteristics between SG3 and SG4. The SG1 consisted of more socially inserted families (78% of professionally qualified heads of households, 72% with a preparatory course; 70% with property tax (IPTU) payment, 88% with running water, 96% with electricity and 83% with access to sewage; 41% with their own house and 38% rented, 75% in a house with ≥ 2 bedrooms; 74% with frequent religious worship). SG2 included families with intermediate social insertion (45% of household heads with semi-professional qualification, 22% with preparatory course; 32% paying property tax, 90% with running water, 96% with electricity and 93% with access to sewage; 56% with rented house, 51% in a house with 1-2 number of bedrooms, 61% with frequent religious worship). The SG3+4 was made up of less socially inserted families (61% of unskilled heads of households, 29% with a preparatory course; 28% paying property tax, 60% with running water, 77% with electricity and 42% with access to sewage; 53% with home rented and 28% invaded/donated, 80% in a home with 1-2 rooms; 58% with frequent religious worship).

Regarding the variable "Income Transfer Program" (*Programa de Transferência de Renda*), which also makes up the social block, families included in the *Bolsa Família* Program were considered[17].

The effect of the social block variables in the first stage of logistic regression, meaning the effect of social and economic policies on the working and living conditions of the population (SG and Income Transfer Program) was analyzed. Variables with significant association remained in the model ($p<0.20$). The variables related to the immediate environment of the child were included in the second stage, while variables of this level remained with $p<0.20$ in the third stage, plus the variables belonging to the dimension of the child's individual processes. Variables with a level of 5% of significance ($p<0.05$) remained in the multiple final model. The strength of association between dependent and independent variables was assessed by odds ratio (OR), univariate

(crude OR) and multiple (adjusted OR) analysis and respective confidence intervals of 95% (95% CI).

Ethical aspects

The project was approved by the Research Ethics Committee of the Universidade de São Paulo School of Nursing under Opinion No. 193.468/13 and authorized by the Health Directorate of the city in accordance with the provisions of Resolution 466/12 of the National Health Council, which regulates ethics in research involving human beings in Brazil.

RESULTS

Of the 348 children who participated in the study, it was found that 29% (n = 101) had ACDM expected for age. Table 1 shows that the vast majority of these children (88.1%) belonged to families from SG2 (42.6%) and SG3+4 (45.5%).

Table 1 – Distribution of children according to the Dimension of Society's Structural Processes (Social Block) and ACDM variables – Itupeva, SP, Brazil, 2013.

Variables	Total (n=348)		ACDM (n=101)		P-Value †
	n	%	n	%	
Social Block					
Social Groups					0.04
SG1	70	20.1	12	11.9	
SG2	141	40.5	43	42.6	
SG3+4	137	39.4	46	45.5	
Income transfer program					0.09
No	275	79.0	74	73.3	
Yes	73	21.0	27	26.7	

†Chi-squared Test.

Table 2 shows that no variable of the Dimension of the Child's Immediate Environment Processes (maternal/paternal block and prenatal care and delivery) was statistically associated with ACDM (p<0.05).

Table 2 – Distribution of children according to the Dimension of the Child's Immediate Environment Processes (Maternal/paternal Block and Prenatal care and delivery Block) and ACDM variables – Itupeva, SP, Brazil, 2013.

Variables	Total (n=348)		AMDI (n=101)		Valor p †
	n	%	n	%	
Maternal/paternal Block					
Age range of the father* (years)					0.44
<30	139	49.1	36	44.4	
30-39	106	37.5	35	43.2	
≥40	38	13.4	10	12.4	
Education of the father* (years)					0.98
<8	71	24.5	20	24.4	
≥8	219	75.5	62	75.6	
Age range of the mother* (years)					0.23
<20	43	12.8	7	7.2	
20-29	174	51.9	52	53.6	
≥30	118	35.2	38	32.2	
Education of the mother* (years)					0.18
<8	77	22.4	27	28.0	
≥8	267	77.6	73	72.0	

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Variables	Total (n=348)		AMDI (n=101)		Valor p †
	n	%	n	%	
Mother works out of the home*					0.61
No	212	61.4	60	59.4	
Yes	133	38.6	41	40.6	
No. of children					**0.22**
1	147	42.2	38	37.6	
2	106	30.5	29	28.7	
≥3	95	27.3	34	33.7	
Pre-natal care and delivery Block					
No. of pre-natal care appointments*					0.86
<6	33	9.6	10	10.0	
≥6	312	90.4	90	90.0	
Delivery type*					0.44
Vaginal	163	47.2	50	50.5	
Cesarean	182	52.8	49	49.5	

*Variables with losses; †Chi-squared Test.

Regarding the variables of the Dimensions of the Child's Individual Processes (Child Block), the statistically significant associations (p<0.05) indicated that the highest proportion of the children with ACDM was 12 months or older, had been born with adequate weight, had not been hospitalized in the last year, and had not been breastfed (Table 3).

Table 3 – Distribution of children according to the Dimension of the Child's Individual Processes (Child Block) and ACDM variables – Itupeva, SP, Brazil, 2013.

Variables	Total (n=348)		ACDM (n=101)		P-Value †
	n	%	n	%	
Child Block					
Age range* (months)					<0.001
<12	211	60.63	35	16.59	
≥12	137	39.37	66	48.18	
Gender					0.97
Female	158	45.4	46	45.5	
Male	190	54.6	55	54.5	
Birthweight					0.03
<2500g	42	12.1	18	17.8	
≥2500g	306	87.9	83	82.2	
Attends Daycare*					0.83
No	301	86.7	87	86.1	
Yes	46	13.3	14	13.9	
Hospitalization in the last 12 months*					0.02
No	305	88.4	83	82.2	
Yes	40	11.6	18	17.8	
Breastfeed					<0.001
No	160	46.0	63	62.4	
Yes	188	54.0	38	37.6	
Current nutritional status*					0.24
Eutrophic	209	61.5	67	66.3	
Low weight	24	7.0	6	5.9	
Overweight	107	31.5	25	27.8	

*Variables with losses; †Chi-squared Test.

Table 4 presents the univariate and multiple analysis of ACDM and the associated variables in the final multiple logistic regression model. The variables with p<0.20 in the univariate analysis were SG, age group, birth weight, hospitalization in the last 12 months and breastfeeding. Only the following variables remained in the final model associated with the outcome: SG and age group, with higher chances for ACDM in SG2 children (OR: 2.37; CI: 1.05-5.35) and GS3+4 (OR: 2.64; CI: 1.18-5.91); and children 12 months or older (OR: 4.17; CI: 2.45-7.08).

Table 4 – Final univariate and multiple analysis of ACDM according to the associated variables in the final multiple logistic regression model – Itupeva, SP, Brazil, 2013.

Variables	Univariate Analysis‡		Final Multiple Analysis‡	
	OR (95% CI)	P>|z|	OR (95% CI)	P>|z|
1 – Social Block				
Social Groups				
SG1	1		1	
SG2	2.12(1.03-4.34)	0.04	2.37(1.05-5.35)	0.03
SG3+4	2.44(1.19- 4.99)	0.01	2.64(1.18- 5.91)	0.01
2 – Maternal/paternal Block				
Age range of the mother* (years)				
<20	1		1	
20-29	2.19(0.91-5.24)	0.07	2.04(0.78-5.31)	0.14
≥30	2.44(0.99-5.99)	0.05	1.17(0.39-3.45)	0.19
3 – Pre-natal care and delivery Block				
No. of pre-natal appointments*				
≥6	1		1	
<6	1.07(0.38-1.85)	0.18	0.75(0.31-1.82)	0.53
4 – Child Block				
Age range (months)*				
<12	1		1	
≥12	4.67(2.85-7.65)	<0.001	4.17(2.45-7.08)	<0.001
Current nutritional status*				
Eutrophic	1		1	
Low weight	0.70(0.26-1.86)	0.48	0.70(0.21-2.36)	0.57
Overweight	0.64(0.37-1.10)	0.10	0.64(0.35-1.16)	0.14

*Variables with losses; ‡ Logistic regression.

DISCUSSION

In addition to the high prevalence of children with ACDM, the results showed that the SG maintained an independent effect on CD. Children from the least socially privileged SG had a two-fold higher chance of ACDM compared to children from the most socially privileged SG, which confirms the study hypothesis.

Thus, the results showed that the way in which families are included in work, which determines consumption and access to housing, sanitation, food, education and healthcare, also determines the way the child's development takes place. The difficulty of insertion in the labor market or the inequality of remuneration among the population class considered 'qualified' in relation to the 'semi' or 'disqualified' worker, linked to precarious housing conditions, lack of access to culture and leisure and egalitarian health policies generate a cycle of poverty and disease[12-13].

Other studies have already established the relationship between CD problems and families' socioeconomic conditions, although using different methods and instruments to assess social status[18-20]. In Pelotas (Rio Grande do Sul state (RS)), it was found that the poorest families were 1.5 times more likely to have suspected developmental delay[7]. Even more surprising results were found in Canoas (RS), with children belonging to families who received zero to one minimum salaries and had a 9.3 times greater chance of suspected developmental delay[21]. Other studies also conducted in the south of the country found that children with delayed CD were from lower-income families[9,11].

None of the variables in the second and third blocks of the hierarchical model remained associated with the outcome in the final regression model. It is noteworthy that

other studies have found an association between CD and prenatal care[9,18-19], which is justified because quality prenatal care is associated with reduced rates of premature and low birth weight and increases adherence to breastfeeding, which contributes to promoting CD[19,22]. Failure to observe such association in the present study may be related to the adherence of almost all women to prenatal care with six or more appointments.

Regarding the next hierarchical level, the only variable which maintained an independent association in the final multiple model was age, because the chance of presenting ACDM increased with the child's age. Similar results were found in the evaluation of 150 children aged 24 to 60 months, which found a higher proportion of changes with increasing age[23]. A study of 438 children aged 4 and 5 years attending public daycare in Feira de Santana (Bahia state) found a higher prevalence of "abnormal" performance among 5-year-olds, with a 1.4 times greater chance[24]. Such a difference could be explained by the accumulation of unfavorable situations, such as lack of stimulation at earlier ages, and exposure to unfavorable social and environmental conditions[19].

At this same hierarchical level, birth weight, breastfeeding and hospitalization in the last 12 months variables were associated with the outcome only in the univariate analysis, losing the effect in the adjusted analysis, unlike the results found in other studies[8,18]. Birth weight has been identified as an important isolated factor in determining changes in CD[7]. Children with low birthweight in the present study had a two-fold higher chance for ACDM in the univariate analysis, which was not maintained in the final model, unlike that observed among children aged 24 to 36 months who attended kindergarten[18]. It could be considered that this result is related to the collinearity between variables, since this variable has an important approximation with social conditions, so that the occurrence of low weight was higher in the less favored SG, meaning that the children born with lower weight belonged to the less favorable SG, which may have contributed to the underweight effect disappearing in the adjusted analysis.

Also, children who were not breastfed had a 2.5 times greater chance for ACDM in the univariate analysis, but this effect disappeared in the adjusted analysis. In another study, children who never breastfed had an 88% higher chance of suspected developmental delay, which remained in the adjusted analysis[7]. Evidence should be considered that breastfed children certainly perform better in their cognitive development and are less exposed to infections and hospitalizations[25], which in turn affect their development.

In fact, children with a history of hospitalization in the last 12 months were twice as likely for ACDM in the univariate analysis, which was also not maintained in the multiple analysis. Nevertheless, it is considered that this condition represents a rupture with the social environment and routine activities and habits of the child, which can cause delay or interruption in the CD process, in addition to constituting a situation of stress due to the experienced procedures and discomforts[26].

In summary, from the child block variables which were associated with the outcome in the univariate analysis, only age remained in the final adjusted model, reinforcing the predominance of the association strength of social variables. Indeed, in relation to the development of cognitive functions, for example, the impact of biological factors, including prenatal and perinatal adversities, these seem to exert greater influence on school age, while the influence of social factors predominates at earlier ages[18-19].

Although there is no uniformity in the methodology for the assessment of social inequality, there is some convergence of results which highlights the importance of social and environmental conditions in the prognosis of CD and the complexity of the involved mechanisms[18-20]. It is in this context that the present study advances in using a Social Class Index, which considers the ways of working and living and classifies families in SG based on working conditions, insertion in the community, housing conditions and access to culture and leisure.

The obtained results therefore confirm that in order to reduce inequalities in CD and health in general, it is necessary to combat poverty and the social, economic, labor and leisure inequality and culture which shapes society, constituting essential conditions for healthy living in healthy environments and fundamental for improving the quality of experiences in the early years of life[27-28].

The classification of children with ACDM and its prevalence in the present study should be interpreted with caution since an assessment test was not used, but rather an instrument for monitoring CD in primary care, which may represent a study limitation. However, the high prevalence of children with ACDM is an important warning for preventing potential delays in CD.

The Ministry of Health has expressed this concern since the 1980s, but studies show that monitoring development is not consolidated in the practice of primary care professionals[29-30]. Considering that the early detection of CD problems helps to prevent diseases which may become irreversible, it is essential that the nursing staff of primary care services evaluate, monitor and mainly expand and strengthen CD surveillance and promotion actions in all opportunities: childcare consultations, home visits, care in other social facilities (schools, daycare centers, social care referral centers, churches, clubs) and even in the administration of vaccines. Referrals and interventions can only be initiated with the lowest possible burden on children by implementing a continuous surveillance health process[10].

For a better approach, nursing team professionals should have a broad view of development and observe the network of social determinants associated with CD delays. In addition, this issue must be a political priority with the commitment of society as a whole to overcome social and health inequalities.

CONCLUSION

The prevalence of ACDM in children under 3 years old enrolled in the primary care network was high, especially among children from families with lower social inclusion and older age. Although CD was verified with a surveillance instrument, the result shows the importance of identifying failures in acquiring any developmental milestones as early as possible in order to minimize the negative effects resulting from this condition. Therefore, there is an urgent need for effectively implemented strategies such as: CD monitoring and promotion by the Primary Care Nursing team as part of comprehensive child care, in any and all opportunities presented by the completion of the surveillance instrument; quality prenatal care for low birth weight prevention; promotion of exclusive breastfeeding up to 6 months and its maintenance up to 24 months; and disease prevention and hospitalization. Furthermore, considering that CD results from the interaction of biological characteristics and socio-environmental conditions linked to family, environment and society, the need for policies and programs aimed at combating social inequities to prevent CD problems is reiterated, as these become worse with age.

RESUMO

Objetivo: Analisar o desenvolvimento infantil em diferentes grupos sociais. **Método:** Estudo transversal com crianças menores de 3 anos cadastradas em unidades básicas de saúde de um município do estado de São Paulo, Brasil. O desenvolvimento infantil foi verificado com a Ficha de Acompanhamento do Desenvolvimento, do Ministério da Saúde. Utilizou-se do Índice de Reprodução Social para classificar famílias em grupos sociais e do modelo teórico hierárquico predefinido para análise de regressão logística univariada e múltipla. **Resultados:** A amostra foi composta por 348 crianças. 29% das crianças apresentavam ausência de algum marco do desenvolvimento esperado para a idade. No modelo final, grupo social e faixa etária associaram-se ao desenvolvimento infantil. Apresentaram maior chance de ausência de algum marco do desenvolvimento crianças dos grupos menos inseridos socialmente e com idade maior ou igual a 12 meses. **Conclusão:** A proporção de crianças com ausência de algum marco do desenvolvimento é elevada e associou-se à menor inserção social. Enfatiza-se a importância da vigilância do desenvolvimento pela equipe de Enfermagem da atenção primária para a identificação dos grupos mais vulneráveis e a intervenção precoce que minimize os efeitos negativos que se agravam com a idade.

DESCRITORES

Desenvolvimento Infantil; Saúde da Criança; Disparidades nos Níveis de Saúde; Determinantes Sociais da Saúde; Enfermagem de Atenção Primária.

RESUMEN

Objetivo: Analizar el desarrollo infantil en distintos grupos sociales. **Método:** Estudio transversal realizado con niños menores de 3 años registrados en unidades básicas de salud de un municipio del Estado de São Paulo, Brasil. El desarrollo infantil fue verificado con la Ficha de Acompañamiento del Desarrollo, del Ministerio de Salud. Se utilizó el Índice de Reproducción Social para clasificar a las familias en grupos sociales y del modelo teórico jerárquico predefinido para análisis de regresión logística univariada y múltiple. **Resultados:** La muestra estuvo compuesta de 348 niños. El 29% de los niños presentaban ausencia de algún marco del desarrollo esperado para la edad. En el modelo final, grupo social y rango de edad se asociaron con el desarrollo infantil. Presentaron mayor probabilidad de ausencia de algún marco del desarrollo niños de los grupos menos incluidos socialmente y con edad mayor o igual a 12 meses. **Conclusión:** La proporción de niños con ausencia de algún marco del desarrollo es elevada y se asoció con la menor inserción social. Se subraya la importancia de la vigilancia del desarrollo por el equipo de Enfermería de la atención primaria para la identificación de los grupos más vulnerables y la intervención precoz que minimice los efectos negativos que se agravan con la edad.

DESCRIPTORES

Desarrollo Infantil; Salud del Niño; Disparidades en el Estado de Salud; Determinantes Sociales de la Salud; Enfermería de Atención Primaria.

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