SOCIAL DETERMINANTS OF HEALTH IN CHILD DEVELOPMENT, SUCRE, COLOMBIA

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Abstract
Conditions involving the family environment, socioeconomic and environmental factors influence the health and development of the individual. This is a quantitative approach study developed in a population of children under 5 years of age from two IPS in the department of Sucre. Among the most outstanding findings is the fact of demonstrating the correlation in the biological determinants, specifically in the variables of age and BMI. Not being representative other determinants in which correlation was found as environmental determinant and lifestyle determinant. It is concluded that age has a notable influence on the development of fine and gross motor skills in almost similar percentages. Also, BMI affects both gross and fine motor skills in children.

Keywords: Child Development; Public Health; Child Behavior; Child Health (Descriptores en Ciencas de la Salud)

Introduction
Early childhood is the most important stage of development, according to statistical data in the Latin America and Caribbean region. "3.6 million children between the ages of 3 and 4 do not have adequate early development for their age" (UNICEF, 2017). Investing in children's development is working for the benefit of society. According to Huiracocha et al. (2012), as long as there is a happy childhood with basic conditions for development that allow for the satisfaction of their physical, emotional, and intellectual needs, there will be confident and secure citizens in the world around them.

Currently, there are several research studies that demonstrate the effect of social determinants on

children's development. For example, Pérez and Muñoz (2019) report that the lower the child's socioeconomic levels, the more disruptions appear in their development. Among the most significant variables are family income and parents' educational level, which determine the stimulation provided to the child. Acosta and Cabrera (2018) analyze the association between social determinants of health and excess weight in children under six years old at Los Ángeles Children's Hospital in Colombia. This case-control study demonstrated the relationship between social determinants, such as age, diet, and staying at home, as important factors associated with weight in children under six years old. Finally, another study conducted by Brigitt, Herrera, and Munar (2019) concludes that childhood development is greatly influenced by socioeconomic conditions, which are determined by historical-cultural aspects. These aspects are predominantly evaluated by functionalist sociology, which adheres to the premise that they are actually isolated factors, and therefore, the consequences are true effects. Based on the above, the objective of this research was to correlate social determinants of health (SDH) with the motor, cognitive, communicative, personal/social, and adaptive development of a group of children under 5 years old affiliated with two healthcare providers in the municipalities of Sincelejo and Corozal. The following research question was addressed: "Do social determinants of health significantly relate to the physical-motor, cognitive-communicative, social-personal, and adaptive development of children under 5 years old in two healthcare providers (IPS) in Corozal and Sincelejo, Sucre?"

Method

Design: A quantitative approach was employed, using a cross-sectional, correlational methodology with a non-probabilistic descriptive sampling. The analysis of information was based on the results obtained from the application of the screening test of the BATTELLE Developmental Inventory, which determined the level of development of functional capacities in children or the presence of deficits in comprehensive areas such as adaptive/social, motor, communicative, and cognitive.

Inclusion and Exclusion Criteria: The following inclusion criteria were considered: belonging to the growth and development program of the selected healthcare providers, being under five years old, not presenting sensory problems (hearing impairments), and accepting voluntary participation in the study. The exclusion criteria included having underlying neurological pathologies and being medicated with drugs that alter the central nervous system.

Participant Characteristics: The analyzed population consisted of 100 children attending two healthcare providers (IPS) in the municipalities of Sincelejo and Corozal, ranging in age from zero (0) to five years (5). The participants were evenly selected (50 participants) from the growth and development program databases implemented in the healthcare institutions.

Data Collection Instruments: Information recorded in an Excel database from the growth and development program in the healthcare institutions was utilized. This information provided access to sociodemographic aspects of the population sample, such as age, gender, index, socioeconomic stratum, education level, health system affiliation, etc.

For anthropometric assessment, weight evaluation was conducted using a calibrated standing scale, and height was measured using a stadiometer. The results were then compared with the "Anthropometric Nutritional Assessment Table for Children under 5 years old," developed by the WHO (2006) and adopted in Colombia through Resolution 2456 of 2016 by the Ministry of Health and Social Protection. This allowed for the classification of nutritional status based on Weight-for-Height (W/H), Height-for-Age (H/A), and Head Circumference-for-Age (HC/A). Additionally, to analyze the prevalence of malnutrition at a population level in the aforementioned age group, along with the mentioned anthropometric indicators, Body Mass Index-for-Age (BMI/A) and Weight-for-Age (W/A) were used.

Furthermore, the screening test of the BATTELLE Developmental Inventory was employed as an evaluation instrument. It allowed for determining the level of development of functional capacities in children or the presence of deficits in the areas of adaptive/social, motor, communicative, and cognitive development.

Data related to sociodemographic variables (age, gender, index, socioeconomic stratum, education level, health system affiliation, etc.), anthropometric assessment, and the BATTELLE Developmental Inventory were initially organized in an Excel database. Subsequently, they were imported into the SPSS program, where frequency, mean, and deviation calculations were initially performed for each variable. A descriptive analysis by categories of each proposed dimension of development was then conducted.

Normality tests were conducted on the selected variables, followed by correlation evaluation to determine the correlation between socioeconomic status and child development, considering the sample size (100). Skewness, kurtosis, and the Kolmogorov-Smirnov test were determined, along with histogram and Quantile-Quantile (Q-Q) plots, to establish whether the data for each variable followed a normal distribution. Once the normality analysis was performed and it was determined that the selected sample did not meet the assumptions of normality, as the data distribution did not follow a normal distribution, the Spearman's rho coefficient was used as a measure of correlation, which applies to non-parametric samples.

Processes for addressing relevant ethical considerations: The obtained information and its respective analysis were conducted in accordance with the ethical principles of Research in Human Beings (Ministry of Health, Republic of Colombia). Personal data confidentiality was ensured according to the right to habeas data and other applicable regulations in Colombia and the healthcare institutions that provide the data. In addition, the informed consent form was signed by the parents, guardians, or family members of the participating children.

Results

For the analysis of biological determinants, various variables belonging to this category are taken into account. These variables include age (Table 2), where it was found that the main age groups are distributed among 3 and 4 years old. Regarding gender, 51% of the surveyed children were female, and 49% were male. The heights ranged from 60 cm to 1.20 m, with the majority (31%) falling between 90-100 cm. Similarly, the weight of the overall population falls within the range of 5-20 kg, with the most representative range being 10-15 kg (54%). Taking into account weight and height, the body mass index was calculated, resulting in an average of 17.25. During the instrument application, it was observed that 72% of the children had poor nutritional status, 25% had a normal weight, and very few were overweight (Table 1).

Table 1 Biological Determinants, Environment, Lifestyle and Health Services of the Population Sample

Biological determinants		Percentage (%)
Age	Less than 1 year	4
	1	17
	2	16
	3	27
	4	22
	5	14
Gender	Male	49
	Female	51
Size	60 - 70 cm	9
	70 – 80 cm	16
	80 – 90 cm	20
	90 cm – 100 cm	31

	100 cm - 1,10 m	18
	1,10 m - 1,20 m	5
	Greater than 1,20 m	1
	5-10	12
Weight in kg	10-15	54
	15-20	26
	Over 20	8
	Under weight	72
Nutritional condition	Normal weight	25
	Overweight	3
Environmental Determinants		**Percentage (%)**
	None	24
	Kindergarten	33
Schooling level	Infant	8
	Pre garden	23
	Garden	2
	Transition	10
	No siblings	32
Number of brothers	1 brother	40
	2 brothers	17
	3 siblings or more	11
Lifestyle Determinants		**Porcentaje (%)**
	Stratum 1	59
Socioeconomic	Stratum 2	38
	Stratum 3	3
	Housewife	57
	Employees of private companies	26
Parents occupation	Independent worker	13
	Student	4
Determinant Health Service		**Porcentaje (%)**
	Cajacopi	3
	Comfasucre	3
	Comparta	8
	Coosalud	13
Health Promoting Entity (HPE) of the affiliated individual	Manezca	1
	Mutual Quibdó	4
	Mutual Ser	16
	Nueva EPS	2
	Salud Total	50
	Contributory	41
User regime	Subsidized	59

In terms of educational level, 33% are in kindergarten, but there is a high percentage of children who do not attend school, representing 24%. Another point is the number of siblings, with 40% having at least one sibling, followed by 32% who are only children (Table 2).

Regarding the lifestyle and social stratum of the children, the data obtained showed that 59% reported living in housing classified as stratum 1, while the rest lived in strata 2 and 3. It is also worth noting that information was collected about the occupation of the caregivers. The majority, representing over 57%, were females working as homemakers. Additionally, among the noteworthy data, at least 6 caregivers were employed in the private sector, while only 4 of them were students.

Regarding healthcare determinants or healthcare regime, 59% of the population is affiliated with the subsidized regime, while 41% are under the contributory regime. With regard to the Health Promoting Entity (HPE), the majority, 50%, are affiliated with Salud Total, while the remaining 50% are affiliated with other healthcare entities (Table 1).

To evaluate the children's development, the BATTELLE Developmental Inventory was applied to determine how many of them have appropriate development for their age. The actual age of the child and an equivalent age determined by the test were used as reference points. The results showed that

55% of the population has development equal to or greater than what is expected for their age, while 45% has development below the expected level for their actual age (Table 2).

Analyzing the development of the child population by dimensions, it is possible to observe that in the cognitive dimension, 62% of boys and girls meet or exceed the expected level of development for their actual age, while 38% do not. In the communicative dimension, 69% achieve the expected level of development, while 31% do not. The receptive dimension stands out in the analysis of the sample, with 84% of the selected sample showing favorable indicators that exceed the average of the others, while only 16% do not reach the expected level. In the expressive dimension, 35% do not reach the expected level, while 65% meet or exceed it. Looking at the motor area dimension, 56% have a good level of development, while 44% do not. This can be observed in fine motor skills, where only 40% surpass the expected level, and in gross motor skills, where 77% do. In terms of the social dimension, 57% demonstrate good social skills, while 38% show adaptability conditions (Table 2).

Table 2 *Areas of cognitive, communicative, receptive, expressive, motor, adaptive and personal social development of the sample Population.*

DIMENSIONS ANALYZED	EXCEEDED OR EQUAL	NOT PASSED
COGNITIVE	62%	38%
COMMUNICATIVE	69%	31%
RECEPTIVE	84%	16%
EXPRESSIVE	65%	35%
GROSS MOTOR	77%	23%
FINE MOTOR	40%	60%
MOTOR	56%	44%
ADAPTIVE	38%	62%
SOCIAL-PERSON	57%	43%

Source: self made

Finally, a correlation was conducted between Social Determinants of Health and comprehensive areas of development in children under 5 years old, after analyzing the normality of the selected variables. This was done to determine the correlation between socioeconomic status and children's development, taking into account the sample size. After observing the values obtained for symmetry, kurtosis, and the Kolmogorov-Smirnov test, as well as histograms and Quantile-Quantile (Q-Q plots) graphs, it is possible to determine that the data distributions of the variables studied do not follow a normal distribution. Therefore, the correlation analysis was performed using non-parametric tests (Table 3).\

TablE 3 *Generalized data: normality test..*

	Kolmogorov - Smirnov			Shapiro - Wilk		
	Statistical	gl	Sig.	Statistical	gl	Sig.
Age in years	0,164	100	0,000	0,925	100	0,000
Number of siblings	0,249	100	0,000	0,841	100	0,000
Socioeconomic	0,376	100	0,000	0,682	100	0,000
Body mass index (BMI)	0,091	100	0,040	0,951	100	0,001
Social/person	0,099	100	0,018	0,941	100	0,000
Adaptive	0,132	100	0,000	0,941	100	0,000
Gross motor	0,097	100	0,000	0,938	100	0,000
fine motor	0,116	100	0,000	0,955	100	0,002
Motor	0,097	100	0,022	0,957	100	0,003
Receptive	0,116	100	0,002	0,950	100	0,001
Expressive	0,150	100	0,000	0,933	100	0,000
Communication	0,117	100	0,002	0,945	100	0,000
Cognitive	0,202	100	0,000	0,865	100	0,000
Total score	0,106	100	0,008	0,940	100	0,000

Source: self made

Taking into account the previous information, the analyzed correlations are determined based on the

statistical results. Category correlation, Table 4 summarizes the statistical data found in the study through the Spearman test.

Table 4 *Correlation.*

SPEARMAN'S RHO	DIMENSIONS RELATED TO EACH AREA	COEFFICIENT OF CORRELATION R	SIGNIFICANCE (BILATERAL) P	CORRELATION
SOCIAL/PERSON	socioeconomic	0,169	0,093	Not
	number of siblings	0,099	0,326	Not
	age in years	0,784**	0,000	correlation
	BMI	-,439**	0,000	correlation
ADAPTIVE	socioeconomic	0,179	0,074	Not
	number of siblings	0,179	0,075	Not
	age in years	o,863**	0,000	correlation
	BMI	-0,393**	0,000	correlation
GROSS MOTOR	socioeconomic	0,162	0,107	Not
	number of siblings	0,074	0,464	Not
	age in years	0,850**	0,000	correlation
	BMI	0,373**	0,000	correlation
FINE MOTOR	socioeconomic	0,211**	0,035	correlation
	number of siblings	0,070	0,488	Not
	age in years	,892**	0,000	correlation
	BMI	,384**	0,000	correlation
MOTOR	socioeconomic	0,193	0,054	Not
	number of siblings	0,076	0,454	Not
	age in years	-,888*	0,000	correlation
	BMI	-,381**	0,000	correlation
COMMUNICATION	socioeconomic	0,073	0,471	Not
	number of siblings	0,169	0,092	Not
	age in years	,791**	0,000	correlation
	BMI	-,420**	0,000	correlation
COGNITION	socioeconomic	0,148	0,143	Not
	number of siblings	,213**	0,033	correlation
	age in years	,843**	0,000	correlation
	BMI	-,382**	0,000	correlation

** Statistical significance. Source: self made

Discussion

Social determinants influence the health and well-being of children, primarily because their physical, social, and emotional capacities are still developing (Sokol et al., 2019; Atashbahar et al., 2022). They can be seen as factors that "add" more specific threats to health or as factors that distill or dilute more direct risk factors (Lundberg, 2020). In this study, according to the results obtained, a significant relationship was found between social determinants of health and motor, cognitive, communicative, adaptive, and social development in children under 5 years old, providing an answer to our research question.

Analyzing the relationship between the personal/social development area and social determinants, a positive and significant correlation with age was observed, with a coefficient of r = 0.78 and a significance level of P<0.05. Similarly, there was a negative and moderate correlation with body mass index (BMI), with a coefficient of r = -0.43 and a significance level of P<0.05. In contrast, no association was found with socioeconomic status and number of siblings. Regarding the adaptive area, positive results were obtained with age, showing a coefficient of r = 0.86 and a significance level of P<0.05. There was also a negative and weak correlation with BMI, with a coefficient of r = -0.393, and no relationship was found with socioeconomic status and number of siblings (Table 5).

In terms of gross motor development, no association was found with the number of siblings or socioeconomic status. However, a strong and positive correlation was observed with age, with a coefficient of R = 0.85 and a significance level of P<0.05. There was also a negative and weak correlation with BMI, with a coefficient of R = -0.373 and a significance level of P<0.05. Similarly,

fine motor development did not correlate with the number of siblings, but it was significantly and positively associated with socioeconomic status, age, and BMI. The overall motor development showed correlations with age and BMI, but no relationship was found with socioeconomic status and number of siblings (Table 5). Another study reports that children with expected motor development for their age will demonstrate adequate cognitive and language development. Therefore, deficiencies in motor development are related to difficulties in conceptual and language development, putting them at a disadvantage compared to their peers (Campo, 2010).

Regarding communicative development, age was correlated with a coefficient of R = 0.79 and a significance level of P<0.05, while BMI showed a negative and moderate correlation. No associations were found with socioeconomic status and number of siblings. Finally, the cognitive area showed correlations with the variables of number of siblings, age, and BMI, but no evidence of a relationship with socioeconomic status (Table 5). It is important to note that due to the nature of the statistical process, the correlations presented here do not primarily represent causality, despite the data supporting their association.

Regarding the biological determinant in the variable of age, a strong positive correlation (0.78) was found with personal and social development. This suggests that as age increases, there is also greater personal and social development, manifested in aspects such as self-concept, interaction with adults, interaction with peers, collaboration, social role, and expression of feelings or affection (Quino and Barreto, 2015; Ingleby, 2012). However, when it comes to the biological determinant in the variable of BMI, a moderate negative correlation (-0.43) was observed, indicating that higher BMI may be associated with lower social and personal manifestations as mentioned earlier (FLACSO, 2005; Sanabria et al., 2020). Similarly, a strong positive correlation (0.86) was found between the biological determinant in the age variable and adaptive development. This suggests that older children demonstrate greater mastery in aspects such as eating, attention, dressing, personal hygiene, and responsibility (Quino, 2015; Pérez and Muñoz, 2019; Sanabria et al., 2020). However, the biological determinant in the BMI variable also showed moderate negative values (-0.43), indicating that higher BMI may affect factors such as eating small food pieces, holding a spoon to eat, removing tight clothing, distinguishing edible from non-edible items, among others (Jasso-Gutiérrez, 2014; Di Cesare et al., 2013).

Another important data point related to the biological dimension in the age variable, which is related to motor development, particularly gross motor skills (0.85), shows that as age increases, there is also greater control of gross motor skills in the study population, making it easier for them to crawl, climb stairs, jump with both feet, skip rope, among others. Similarly, BMI showed negative values when correlated with gross motor development (-0.373), indicating that higher BMI poses a slight risk of complications in performing movements associated with gross motor skills (Ministerio de Protección Social, 2012; Dahlgren and Whitehead, 2006). Another correlation was observed between the lifestyle determinant in the variable of socioeconomic status and motor development (0.21), specifically in fine motor skills. In this case, it is presumed that higher socioeconomic status is associated with better performance in fine motor skills, or at least a minimal correlation. The biological determinant in the age variable also showed a strong positive correlation (0.89) with fine motor development, suggesting that older children in the study sample performed better in fine motor skills (Unicef, 2018; Palau, 2005).

In a different analytical approach, it was found that the biological determinant in the BMI variable had a weak negative correlation with fine motor development. This means that children with higher weight had poorer performance in fine motor skills, experiencing difficulties in activities such as cutting paper with scissors, copying numbers from 1 to 5, copying uppercase and lowercase letters, among others (Rodríguez et al., 2007; Calderón et al., 2011). In general terms, there was a strong positive correlation between the biological determinant in the age variable and motor development

(0.88), while the opposite occurred in the relationship between the biological determinant in the BMI variable and motor development (-0.381). Furthermore, the biological determinant in the age variable showed a strong positive correlation with communicative development (0.79), while there was a moderately negative correlation between the BMI variable and communicative development (-0.42). This suggests that as children age, there is a tendency to improve communicational aspects, whereas those with certain levels of overweight showed a moderate decrease in communication skills (Rebello, 2019).

Furthermore, another noteworthy aspect in this study corresponds to the associations (Number of siblings-cognitive development), (age-cognitive development), and (BMI-cognitive development). The statistics demonstrated that a higher number of siblings was associated with better cognitive performance in the study sample, at least to a mild extent (0.21). Similarly, greater age was also associated with higher cognitive performance (0.79), but the same did not apply to the comparison with BMI, where the values showed a weak negative correlation (-0.382). Based on the previous information, correlation was predominantly found in the biological determinants specifically in the variables of age and BMI. Additionally, other determinants that showed correlation include the environmental determinant (number of siblings) and the lifestyle determinant (socioeconomic status). Indeed, one of the social determinants that has a significant impact can be measured through BMI, revealing the nutritional factor. This demonstrates that nutrition is one of the fundamental elements in the physiological well-being of any individual, especially those under the age of 5. In this sense, it is important to highlight that the aforementioned values indicate greater favorability in dimensions such as cognitive development when the child's BMI is within the healthy range. Thus, both undernutrition and overweight are detrimental and affect other factors such as the child's socialization. Studies by Vargas and Hernández (2020) demonstrate that the highest rates of malnutrition are found in the Caribbean region. 15.4% of children under the age of five suffer from chronic malnutrition (3.8% in San Andrés and 27.9% in La Guajira). In terms of global malnutrition, La Guajira has rates of 11.1% (the national average is 3.4%). This significantly affects various dimensions of the child, compromising their quality of life and development due to external factors such as poverty and household instability. The results obtained in this study could serve as a basis for implementing intervention programs for children under the age of 5 in the sample population to stimulate their development. Additionally, it is important for healthcare professionals working with children to be aware of the impact of social determinants of health on the children under their care, ensure that their clinical services are accessible and acceptable to all children and families within the limitations of the country's healthcare services, and engage in community and national-level promotion activities (Spencer et al., 2019; Hardy et al., 2021). The authors recommend conducting similar studies at the departmental and even national level, which could contribute to the formulation of policies associated with understanding the social determinants in children under the age of 5 and how it affects their development.

In conclusion, a picture of predominant correlations between some social determinants and cognitive-communicative, social-personal, and adaptive motor development was obtained. Among them, it was observed that higher age is associated with higher BMI. However, it should be noted that when BMI is higher or lower than recommended, it can have repercussions on cognitive and communicative development. Regarding age, there is a directly proportional relationship with fine and gross motor development. It is expected that with increasing age, there will be greater mastery of these motor skills. Finally, a significant determinant is BMI, which reflects the nutritional status, as low nutritional status predisposes children to deficiencies in development and compromises their overall health due to immune system imbalances.

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