

Family psychosocial characteristics, tobacco, alcohol, and other drug use, and teenage pregnancy

Características psicossociais familiares e uso de tabaco, álcool e outras drogas relacionadas à gravidez na adolescência

Características psicosociales familiares y el uso del tabaco, alcohol y otras drogas relacionadas con el embarazo en la adolescencia

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Abstract

The aim of this study was to analyze associations between demographic factors, family psychosocial characteristics, tobacco, alcohol, and other drug use, and adolescent motherhood. This was a case-control study in Porto Alegre, Rio Grande do Sul State, Brazil, with 431 adolescents 14 to 16 years of age who gave birth in 2009 (cases) and 862 adolescents who had never given birth (controls). Three-stage hierarchical logistic regression was performed (demographic, family psychosocial, and lifestyle variables). Lower economic class, not having lived with the parents from 10 to 14 years of age (OR = 1.67; 95%CI: 1.12-2.48), having taken care of other children (OR = 1.42; 95%CI: 1.09-1.87), siblings who had children before 20 years of age (OR = 1.56; 95%CI: 1.19-2.06), having tried smoking (OR = 1.94; 95%CI: 1.35-2.78), and having arrived home intoxicated (OR = 1.67; 95%CI: 1.12-2.48) were associated with adolescent motherhood. Greater attention should be given to family relations in association with tobacco and alcohol consumption, since the use of these substances is associated with adolescent motherhood.

Pregnancy in Adolescence; Alcohol Drinking; Smoking; Street Drugs

Resumo

O objetivo foi estudar a associação entre fatores demográficos, características psicossociais familiares, uso de tabaco, álcool e outras drogas e a gravidez na adolescência. Estudo de caso-controle com 431 adolescentes, com idades entre 14 e 16 anos, de Porto Alegre, Rio Grande do Sul, Brasil, que tiveram filhos em 2009 (casos), e 858 adolescentes sem filhos (controles). A regressão logística hierárquica foi realizada em três etapas (variáveis demográficas, variáveis psicossociais familiares e variáveis de estilo de vida). A menor inserção econômica, não ter morado com os pais entre 10 e 14 anos (RC = 1,67; IC95%: 1,12-2,48), experiência no cuidado de crianças (RC = 1,42; IC95%: 1,09-1,87), irmãos que tiveram filhos antes dos 20 anos (RC = 1,56; IC95%: 1,19-2,06), experimentação de tabaco (RC = 1,94; IC95%: 1,35-2,78) e já ter chegado em casa embriagada (RC = 1,67; IC95%: 1,12-2,48) associaram-se à gravidez na adolescência. Maior atenção deve ser dada às relações familiares em relação ao consumo de tabaco e álcool, considerando que o uso destas substâncias se associam à gravidez na adolescência.

Gravidez na Adolescência; Consumo de Bebidas Alcoólicas; Hábito de Fumar; Drogas Ilícitas

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Introduction

According to the Brazilian Institute of Geography and Statistics (IBGE; <http://www.ibge.gov.br>), the country's female population 10 to 19 years of age totaled more than 16 million in the year 2010. Changes in teenagers' sexual behavior patterns merit special attention, due to the repercussions, including early pregnancy¹. Teenage pregnancy has become a public health problem, since it potentially leads to physical, emotional, social, and economic problems for both the mother and infant^{2,3,4}.

In Brazil, the highest teenage pregnancy rates occur in low-income groups, and there is an association between high adolescent parity and low schooling^{5,6}.

According to a study on risk behaviors in a young population, extreme vulnerability due to involvement in a context of violence increases the association between early pregnancy and other risk behaviors⁷. Such living conditions facilitate different forms of family organization in which both parents are not always present, which can limit opportunities for family bonds and support, thereby further increasing vulnerability and risk exposure^{8,9,10}. This context of lack of family protection places youth at even greater vulnerability and exposes them to various factors, including early pregnancy. A typical culture is established, potentially more lenient towards adolescents' social activity, besides representing a model for family configuration and lifestyles^{11,12}.

In low-income settings, teenage pregnancy can be permeated by positive meanings, where it is taken for granted as a life choice associated with the perception of otherwise limited options and opportunities^{3,13}. Motherhood can be seen by the teenage girl as an attempt to ensure a stable relationship with the male partner, to acquire independence from her nuclear family, and to achieve an effective feminine identity, in addition to consolidating a social role that she sees as within her reach^{14,15,16}. In a society that culturally assumes marriage as a prior condition for establishing a family, the adolescent girl's stable relationship with the child's father appears to contribute to the representation of early pregnancy as a natural and desirable event¹⁷. Trans-generational issues such as a history of early motherhood in the family and the girl's caring for other children during childhood have also been associated with adolescent motherhood^{18,19,20,21,22}.

As for lifestyles, socialization means that the values, attitudes, and beliefs of the social context, translated in family relations and behaviors, are assumed as the possible and natural way of

life²³. Thus, tobacco, alcohol, and drug use in the family represents a model to be followed by the adolescents^{24,25}. Studies show that trying alcohol and tobacco for the first time often occurs during adolescence, many times within the family setting^{10,26,27,28}. Research points to substance use by the family and by adolescent girls as a factor associated with early motherhood^{29,30}.

There are various types of families, and relations among their members determine the group's protective or risk roles²⁴. It is important to consider the socioeconomic and cultural setting to which the family belongs, the family socialization processes, and the parenting styles, since these are usually the backdrop for the phenomenon of adolescent motherhood. The current study thus aimed to analyze the association between demographic factors, family psychosocial characteristics, and tobacco, alcohol and other drug use and adolescent motherhood.

Method

The study used a case-control design. Cases were defined as adolescent mothers. For each case, two controls were selected among adolescents who had never given birth and lived in the same neighborhood. The target population for cases consisted of all adolescents girls from 14 to 16 years of age who had given birth and lived in Porto Alegre, Rio Grande do Sul State, Brazil, in 2009.

The point of departure for calculating the sample size was the number of mothers 14 to 16 years of age in 2006 (860 cases) according to the Information System on Live Births (SINASC) in Porto Alegre. It was assumed that this same number of deliveries occurred in 2009. The study used Epi Info (Centers for Disease Control and Prevention, Atlanta, USA) with significance set at 0.05, study power 80%, case/control ratio 1:2, and 20% minimum exposure rate among controls, and calculated 415 cases and 830 controls.

The Surveillance Team on Vital Events of the Division on Health Surveillance provided a list of all adolescents 14 to 16 years of age that gave birth in 2009. This allowed identifying the adolescent mothers and their addresses.

As the case selection strategy, initially for every two adolescents, one was picked for the visit. If her household was not located, the case was replaced by the adolescent immediately before or after her on the list. After the interview with the case was obtained, the respective controls were searched for among the households in the case's neighborhood. One side of the street was picked, and the selection alternated houses one on each

side of the street until two adolescents were found who were the same age as the case (plus or minus a year), but who had never given birth.

A questionnaire was developed especially for the project, *Factors Associated with Adolescent Pregnancy: a Case-Control Study in 14-16-Year-Old Adolescents in Porto Alegre*, based on a literature review and other studies on adolescent sexuality^{31,32}.

The study used demographic data on the adolescent (age, skin color, religion, economic class, and schooling), lifestyle (history of use of tobacco, alcohol, and/or illegal drugs, intoxication, family's reaction to intoxication, family member with alcohol or drug-related problems), and family's psychosocial characteristics (raised by biological or social mother, loss of biological mother, schooling of the adolescent's mother, persons with whom the adolescent lived from 10 to 14 years of age, caregiver during most of the adolescent's life, experience caring for other children, age of the adolescent's mother at first childbirth, and siblings who had children before 20 years of age).

Data collection lasted from August 2009 and to December 2010. The data were collected by female university students enrolled in the health sciences who received training and weekly follow-up during meetings with the entire project team. The questionnaire was completed by the interviewers and later processed using the TELEform system (Autonomy Inc., San Francisco, USA). This software replaces manual data entry with an automatic scanning process that transposes the data to a database in a statistical package.

The project team conducted the quality control, both in performing the interviews and for the precision of the scanned data. The data were analyzed with SPSS 18.0 (SPSS Inc., Chicago, USA).

The data analysis began with bivariate analyses between the outcome and the study factors. The multivariate logistic regression included the variables that originally presented p-values < 0.20. The logistic regression was performed according to a three-stage hierarchical model. The demographic variables were introduced in the first stage, and only those with p < 0.10 were kept in the model. Family psychosocial variables were introduced in the second stage, using the same criterion to be kept in the regression. The third stage included lifestyle variables. Significant associations were defined as those with p-values < 0.05 in the stage in which they were introduced in the model.

The research project was approved by the Ethics Research Committee of Universidade Luterana do Brasil (ULBRA; case no. 2008-095H)

and the Porto Alegre Municipal Health Secretariat (case no. 001.017587.09.3). The parents or guardians signed a free and informed consent form attesting that the adolescent agreed to participate in the study.

Results

Table 1 shows the main demographic characteristics of cases and controls. No significant differences were found between cases and controls for race/color or religion; of the total, there was a slight predominance of adolescents with self-reported white race/skin color, and the majority were Catholic. As for the other variables, the controls showed higher economic class and more schooling and were younger on average than cases (p < 0.05).

As for family psychosocial characteristics and lifestyle, of the 15 respective variables, only four were statistically associated with adolescent motherhood: loss of biological mother, schooling of the adolescent's biological or social mother, the adolescent's main lifetime caregiver (Table 2), and family history of drug problems (Table 3).

In the hierarchical logistic regression model, variables with p < 0.20 in the stage in which they were introduced remained in the regression in order to control for possible confounding. According to the final model (Table 4), six factors were significantly associated with adolescent motherhood (p < 0.05).

Girls belonging to economic classes C and D+E showed three times higher odds of adolescent motherhood than those from class B. Likewise, those that had not lived with one or both parents when they were 10 to 14 years old, those with experience in caring for other children, and those whose siblings had children before they were 20 showed higher odds of adolescent motherhood.

Finally, in relation to substance use, girls that had tried smoking showed twofold higher odds of motherhood than those who had not; having come home intoxicated was also associated with increased odds of adolescent motherhood.

Discussion

The current study shed light on the reality of adolescent mothers in their life setting, that is, in the place where they lived and their living conditions. The fact that the sample of cases was selected from a list of all live births, which could have been from anywhere in the city and thus represented socioeconomic and cultural diversi-

Table 1

Demographic characteristics of adolescent girls with and without children. Porto Alegre, Rio Grande do Sul State, Brazil, 2009.

Demographic variables	Cases (N = 431)		Controls (N = 858)		OR (95%CI)	p-value
	n	%	n	%		
Age (years)						
14	54	12.6	338	39.9	1.00	< 0.001
15	134	31.4	293	34.6	2.27 (1.71-3.02)	
16	240	56.1	217	25.6	3.81 (2.93-4.95)	
Race/Color						
White	206	49.2	418	50.8	1.00	0.588
Non-white	213	50.8	405	49.2	1.064 (0.84-1.35)	
Religion						
Non-Catholic	66	17.4	148	19.9	1.00	0.111
Catholic	165	43.5	352	47.3	1.03 (0.81-1.31)	
None	148	39.1	244	22.8	1.22 (0.96-1.55)	
Economic class						
B	20	4.7	51	6.0	1.00	< 0.001
C	334	77.9	744	87.1	1.09 (0.75-1.61)	
D+E	75	17.5	59	6.9	1.98 (1.33-2.96)	
Schooling						
Middle School	42	12.7	33	20.1	1.00	0.021
Primary School	290	87.3	131	79.9	1.73(1.05-2.86)	

95%CI: 95% confidence interval; OR: odds ratio.

ty, allowed power for generalization. Some studies have limited the focus to adolescent students, thereby limiting the possibility of extrapolation, since enrollment in school can be considered a protective factor against various teenage risk behaviors^{33,34}. The current study's results can thus contribute to interventions targeting the prevention of teenage pregnancy, relating family lifestyles to the issue.

Both the cases and the controls lived in peripheral low-income areas of Porto Alegre. However, economic class was higher on average in the controls. Some studies have shown an association between lower economic status and teenage pregnancy^{35,36,37}. In Santo André, São Paulo, a study comparing adolescent mothers living in four areas with different degrees of social exclusion found that higher fertility was associated with worse socioeconomic conditions³⁵. According to a study comparing adolescent mothers and young adult mothers in Macaíó, Alagoas State, even though both groups showed low monthly family income, per capita income was lower in the adolescent group³⁶. In São Luís, Maranhão State, a study on differences in socioeconomic characteristics between adolescents under 18 years of age, 18 to 19, and women over this age found that the under-18

and 18-to-19-year groups had lower mean family income³⁷.

Teenage pregnancy is associated with adolescent girls not living with their parents during puberty, from 10 to 14 years of age. The association between living away from home and adolescent motherhood was shown in a review study of adolescents living on the streets, where a recurrent finding was that young women who had lived away from home for longer periods of time were more prone to becoming pregnant³⁸. As for the reasons for not living with their families, domestic violence and precarious family conditions are key factors and reflect socioeconomic exclusion³⁹. However, these findings should be interpreted with caution, since the study's target population consisted of girls living on the streets, which was not the case of the adolescents analyzed in the current study. At any rate, one can assume that the need to live away from home indicates family problems (although the current study did not explore reasons for leaving home).

The fact that taking care of other children was associated with adolescent motherhood in the current study could be understood based on differences in socialization between the male and female genders. Gender is a social construction

Table 2

Family psychosocial characteristics of adolescent girls with and without children. Porto Alegre, Rio Grande do Sul State, Brazil, 2009.

Family characteristics	Cases (N = 431)		Controls (N = 858)		OR (95%CI)	p-value
	n	%	n	%		
Raised by biological or social mother						
Yes	382	88.6	796	92.8	1.00	0.012
No	49	11.4	62	7.2	1.64 (1.11-2.44)	
Loss of biological mother						
No	421	97.7	827	96.4	1.00	0.212
Yes	10	2.3	31	3.6	1.57 (0.76-3.24)	
Schooling of adolescent's mother						
Complete primary or greater	143	35.9	314	38.8	1.00	0.331
Never attended school or incomplete primary	255	64.1	495	61.2	1.13 (0.88-1.45)	
Lived from 10 to 14 years of age with						
One or both parents	334	81.5	742	89.2	1.00	< 0.001
Others	76	18.5	90	10.8	1.87 (1.34-2.61)	
Principal caregiver						
One or both parents	354	82.1	722	84.3	1.00	0.311
Other family members or others	77	17.9	134	15.7	1.17 (0.86-1.59)	
Experience caring for other children						
No	147	34.1	380	44.3	1.00	< 0.001
Yes	284	65.9	478	55.7	1.53 (1.20-1.95)	
Age of adolescent's mother at first childbirth (years)						
12-17	196	48.8	290	38.3	1.53 (1.19-1.95)	< 0.001
≥ 18	206	51.2	673	61.7	1.00	
Siblings with children before 20 years of age						
No	244	58.5	580	69.8	1.00	< 0.001
Yes	173	41.5	251	30.2	1.63 (1.28-2.09)	

95%CI: 95% confidence interval; OR: odds ratio.

in which society assigns specific roles to men and women. In Western culture, women are responsible for learning and performing activities related to the household, such as caring for the home and raising the children. Meanwhile, men are assigned the tasks of supporting and protecting the family ⁴⁰.

In low-income groups, although young people of both sexes begin working as teenagers, the meanings assigned to work are not the same, differing according to the expectations and representations of social gender roles. For women, one such role is motherhood. From an early age, young girls are prepared to be mothers, learning to care for the home and the younger siblings ^{41,42}. In addition, familiarity with taking care of other children makes motherhood a possible life project. Caring for siblings and other children assesses the girl's capacity to fulfill her role, reinforcing her socialization. In this sense, the

skills she acquires contribute to her predisposition to have her own children ⁴³. In addition, the culture of motherhood becomes a valued factor in certain socio-cultural and economic settings ⁴⁴.

As for trans-generational factors, the literature shows that maternal history of teenage pregnancy is associated later on with early pregnancy in daughters ^{5,45}. This association did not appear among the participants in the current study. However, there was a higher probability of motherhood among adolescent girls whose siblings also had children before age 20. The literature approaches siblings' early motherhood/fatherhood as a potential risk factor for early motherhood. The phenomenon could be interpreted as a possible strengthening of fraternal ties in families where the parents are more absent, and where older siblings are responsible for caring for the younger ^{19,20,21,22}.

Table 3

Use of tobacco, alcohol, and other drugs by adolescent girls with and without children and by their family members. Porto Alegre, Rio Grande do Sul State, Brazil, 2009.

Substance use	Cases (N = 431)		Controls (N = 858)		OR (95%CI)	p-values
	N	%	n	%		
Tried smoking						
No	200	46.5	575	67.3	1.00	< 0.001
Yes	230	53.5	279	32.7	2.37 (1.86-3.00)	
Tried drinking						
No	77	17.9	216	25.4	1.00	0.002
Yes	352	82.1	633	74.6	1.55 (1.16-2.08)	
Ever arrived home intoxicated						
No	267	62.2	672	78.3	1.00	< 0.001
Yes	162	37.8	186	21.7	2.19 (1.70-2.82)	
Family's reaction if arrived home intoxicated						
Would realize and would be upset	221	87.7	651	95.5	1.00	< 0.001
Would not realize or would not care	31	12.3	31	4.5	2.94 (1.75-4.95)	
Tried illegal drugs						
No	397	92.3	830	96.8	1.00	< 0.001
Yes	33	7.7	27	3.2	2.55 (1.51-4.30)	
Someone in the family with alcohol problems						
No	181	42.5	422	49.6	1.00	0.016
Yes	245	57.5	429	50.4	1.33 (1.05-1.68)	
Someone in the family with drug problems						
No	266	62.9	573	67.3	1.00	0.114
Yes	157	37.1	278	32.7	1.21 (0.95-1.55)	

95%CI: 95% confidence interval; OR: odds ratio.

As for substance use, in this study, having tried smoking was associated with adolescent motherhood. No studies were found in the literature showing a direct association between history of smoking and adolescent motherhood, but the results of the current study refer to the family context. A study in Santo André, São Paulo State, aimed at assessing the profile of adolescents that tried smoking showed the influence of the social and family setting as a significant factor¹¹. In a study in Gravataí, Rio Grande do Sul State, among adolescents that had tried smoking at least once, 34.8% reported smoking at home. Some 58.6% of students that had tried smoking reported that at least one of their parents smoked, and this association was statistically significant³². In *Brazilian National Survey on Schoolchildren's Health* (PENSE), 1.3% of the interviewees replied that their parents would not care if they knew they smoked⁴⁶. In this sense, the family can be identified as a facilitator for smoking and an environment that can fail to protect against an unhealthy lifestyle, where early motherhood can be the outcome. The same is true

for alcohol, considering the variable on having arrived home intoxicated.

The consumption of high amounts of alcohol (as in intoxication), due to its effect on consciousness, poses an increased risk of unprotected sex. An exploratory study of six university students from different socioeconomic strata in Bogotá, Colombia, showed that alcohol was present at the moment of conception, preventing the recognition of a risk situation for unwanted pregnancy. In addition, in their life histories, the young women displayed vulnerability as expressed by absence of parental authority, negative communication, conflictive family relations, permissiveness towards alcohol consumption, exposure to persons that consumed alcohol, easy access to alcoholic beverages, emotional needs, and experience with unequal gender values²⁹. A population-based study of university students in Bogotá showed that 70% consumed alcohol, and that 30% admitted having had unplanned sexual relations while under the influence⁴⁷.

Although alcohol consumption by adolescent girls can lead to a decrease in contracep-

Table 4

Hierarchical model of demographic, family, and lifestyle factors related to consumption of tobacco, alcohol, and other drugs associated with adolescent motherhood. Cases (n = 431), controls (n = 858). Porto Alegre, Rio Grande do Sul State, Brazil, 2009.

	OR (95%CI)	p-value
Stage 1		
Religion		
Non-Catholic	1.00	0.119
Catholic	1.12 (0.69-1.81)	
None	1.74 (1.01-3.02)	
Economic class *		
B	1.00	0.005
C	3.29 (1.57-6.92)	
D+E	4.63 (1.44-14.84)	
Schooling		
Middle School	1.00	0.109
Primary School	1.57 (0.90-2.74)	
Stage 2		
Raised by biological or social mother		
Yes	1.00	0.264
No	1.37 (0.79-2.41)	
Lived from 10 to 14 years with **		
One or both parents	1.00	0.012
Others	1.67 (1.12-2.48)	
Experience caring for other children **		
No	1.00	0.011
Yes	1.42 (1.09-1.87)	
Age of adolescent's mother at first childbirth (years)		
12-17	1.25 (0.96-1.63)	0.103
≥ 18	1.00	
Siblings with children before 20 years of age **		
No	1.00	0.001
Yes	1.56 (1.19-2.06)	
Stage 3		
Tried smoking		
No	1.00	< 0.001
Yes	1.94 (1.35-2.78)	
Tried drinking		
No	1.00	0.914
Yes	1.02 (0.66-1.60)	
Ever arrived home intoxicated		
No	1.00	0.011
Yes	1.67 (1.12-2.48)	
Family's reaction if arrived home intoxicated		
Would realize and would be upset	1.00	0.073
Would not realize or would not care	1.77 (0.95-3.31)	
Tried illegal drugs		
No	1.00	0.425
Yes	1.37 (0.63-2.98)	

(continues)

Table 4 (continued)

	OR (95%CI)	p-value
Stage 3		
Family member with alcohol problems		
No	1.00	0.462
Yes	1.14 (0.81-1.60)	
Family member with drug problems		
No	1.00	0.516
Yes	1.12 (0.79-1.60)	

95%CI: 95% confidence interval; OR: odds ratio.

* Variable selected for inclusion in second stage of hierarchical regression;

** Variables selected for third stage of hierarchical regression.

tive precautions, this behavior can be used as a lifestyle indicator and a symptom of dissatisfaction with family relations^{29,48}. Thus, alcohol consumption is present in unprotected sexual behavior, with its roots in the primary socialization context. Children and adolescents tend to learn values, habits, and attitudes based on their family experiences²⁹.

According to Schenker & Minayo²⁴, parents who talk with their children since early childhood and that succeed in establishing clear limits over the course of their upbringing build a strong protective net against the consumption of psychoactive substances during adolescence. Thus, young people with greater support and that feel understood by their families show lower use of tobacco, alcohol, and other drugs¹⁰. The configuration of factors associated with adolescent motherhood demonstrates the importance of family ties, social support, transmission of family values and parenting styles, both directly and indirectly by means of the control and supervision of alcohol and tobacco consumption in relation to early pregnancy.

The sample of 431 cases and 858 neighborhood controls allowed greater homogeneity between cases and controls. However, the study's results cannot be generalized to adolescents from higher social classes, since the majority of the girls belonged to classes C, D, and E. Another limitation that may have affected the results is recall bias, which influences the precision of responses referring to events in the past. In addition, the fact that the questionnaire was completed at the adolescent's home, often in the presence of some family member, may have influenced the girls' answers.

Family psychosocial characteristics represent the context in which tobacco and alcohol-related behaviors emerge. Greater attention should thus be given to family relations as risk or protective factors for substance use and adolescent motherhood. The study's findings as a whole indicate a public health problem that needs to be dealt with through targeted policies for adolescent girls and their families.

Resumen

El objetivo del estudio fue estudiar la asociación entre factores demográficos, características psicosociales familiares, consumo de tabaco, alcohol y otras drogas y el embarazo en la adolescencia. Estudio de caso-control con 431 adolescentes de edades comprendidas entre los 14 y los 16 años de Porto Alegre, Río Grande do Sul, Brasil, que dieron a luz en 2009 (casos) y 862 adolescentes sin hijos (controles). La regresión logística jerárquica se realizó en tres etapas. Variables demográficas, psicosociales, familiares y de estilo de vida. La menor inserción económica, no haber vivido con los padres entre 10 y 14 años (OR = 1,67; IC95%: 1,12-2,48), la experiencia en el cuidado de niños (OR = 1,42; IC95%: 1,09-1,87), hermanos que tuvieron hijos antes de los 20 años (OR = 1,56; IC95%: 1,19-2,06), el hecho de haber probado el tabaco (OR = 1,94; IC95%: 1,35-2,78) y el que ya hayan vuelto a casa embriagadas (OR = 1,67; IC95%: 1,12-2,48) se asoció con el embarazo en la adolescencia. Se debe prestar una mayor atención en las relaciones familiares al consumo de tabaco y alcohol y se debe tener en consideración que su uso se asocia al embarazo en la adolescencia.

Embarazo en Adolescencia; Consumo de Bebidas Alcohólicas; Hábito de Fumar; Drogas Ilícitas

Contributors

C. S. Faler participated in the study design, data collection, analysis, and interpretation, and critical revision of the article. S. G. Camara, G. G. Alves, D. R. G. C. Aerts, and J. U. Béria collaborated in the study design, data interpretation, critical revision of the article, and final approval for publication.

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