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Incompleteness and inaccuracies in Certificates of Live Birth in a city in Southern Brazil

Incompletudes e incorreções nas Declarações de Nascidos Vivos em um município no Sul do Brasil

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ABSTRACT: ***Objective:*** To evaluate inadequacies in Certificates of Live Birth in a city in Southern Brazil between 2011 and 2015. ***Methods:*** This is a retrospective quantitative study based on Certificates of Live Birth of mothers living in Itapema, Santa Catarina, issued from 2011 to 2015, using data from the Live Birth Information System. ***Results:*** Among 3,537 certificates, we found no mistakes in the variables newborn's sex, birth weight, maternal age, type of pregnancy, and type of delivery. Concerning incompleteness, the variable "cesarean section was performed before the start of labor" had a mean rate considered poor, while occupation was classified as good (above 6%), neighborhood as excellent (between 0.8 and 4.5%), and induction also as excellent (0.7 to 2.9%). Inaccuracies were greater in the ethnicity (up to 0.7%) and neighborhood (up to 1.3%) variables, both considered excellent. In the comparison between sections, the pregnancy and childbirth section was the most incomplete. ***Conclusion:*** Data completeness in Certificates of Live Birth was considered excellent for most variables, and the classification of inaccuracies was excellent for all variables, evidencing the quality of the information found in these certificates.

Keywords: Birth certificates. Health status indicators. Information systems. Health systems.

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RESUMO: ***Objetivo:*** Avaliar inadequações nas declarações de nascidos de um município do Sul do Brasil entre 2011 e 2015. ***Métodos:*** Quantitativo retrospectivo a partir das Declarações de Nascidos Vivos de mães com residência em Itapema, Santa Catarina, no período de 2011 a 2015, utilizando os dados do Sistema de Informação de Nascidos Vivos. ***Resultados:*** Em 3.537 declarações, não foram encontradas falhas nas variáveis sexo e peso do recém-nascido, idade da mãe, tipo de gravidez e tipo de parto. Sobre incompletudes, a variável "cesárea ocorreu antes do trabalho de parto iniciar" teve classificação média como ruim; ocupação, como bom (acima 6%); bairro (entre 0,8 e 4,5%), como excelente; e indução (0,7 a 2,9%), também como excelente. As incorreções apresentadas foram maiores nas variáveis raça/cor (até 0,7%) e bairro (até 1,3%), ambas classificadas como excelente. Na comparação entre seções, gestação e parto apresentaram maiores incompletudes. ***Conclusão:*** A completude dos dados das Declarações de Nascidos Vivos foi considerada excelente na maior parte das variáveis, e a classificação das incorreções resultou em excelente para todas as variáveis, evidenciando a qualidade das informações dessas declarações.

Palavras-chave: Declaração de nascimento. Indicadores básicos de saúde. Sistemas de informação. Sistemas de saúde.

INTRODUCTION

Identifying the social and epidemiological profile of pregnant women and newborns treated in the Brazilian territory is essential to assess the effectiveness of the actions recommended by the Ministry of Health to humanize care. The early recognition of gestational and neonatal risk factors implies care promptness and planning, resulting in reduced maternal and infant morbidity and mortality[1].

In the face of this need, the Ministry of Health implemented, in 1990, the Live Birth Information System (*Sistema de Informação de Nascidos Vivos* – SINASC), based on the Certificate of Live Birth (*Declaração de Nascido Vivo* – DNV), whose objective is to provide information about the characteristics of live births, as well as maternal and gestational data[2].

The DNV is the default document for live birth data collection, filled throughout the national territory. The health professionals charged with childbirth care (midwives, doctors, nurses) are responsible for filling and issuing the DNV, which consists of variables that encompass statistical, sociodemographic, and epidemiological data related to maternal and neonatal health, representing the main data source for births and maternal profile[2].

In 2011, the DNV model[2] underwent some changes, such as adding the baby's name and removing the newborn ethnicity field. With respect to the maternal variables, the fields included were date of birth, marital status, ethnicity, the date of the last menstruation, and the gestational month in which she had the first prenatal care visit. Some fields were modified, such as schooling, which changed from years of schooling to educational level, and pregnancy and childbirth, which was expanded to include whether the labor was induced or not[2].

One of the first studies about SINASC was conducted two years after its implementation, in the city of São Paulo, in 1992, and identified an excellent system coverage, albeit

with weaknesses in some variables (Apgar score, gestational duration, maternal education, total number of children, and the father's name)[3]. In 2007, a survey in Pernambuco indicated good system coverage[4]. More broadly, in 2002, Romero and Cunha[5] evaluated SINASC data from Brazil, the main regions, and the states and Federal District, concluding that this system has good data completeness and information consistency for most variables. However, quality issues were identified in the previous children and occupation variables. In São Luís[6], completeness was considered regular to excellent, with higher failure percentages in the variables: gestational age, maternal occupation, and number of living and dead children.

This scenario requires a constant evaluation of DNV variables, both due to the changes made and to its importance as an instrument of information and guidance for public policies related to maternal and neonatal health. Thus, we aimed to evaluate the inadequacies in the filling of DNVs in the city of Itapema, Santa Catarina, between 2011 and 2015.

METHODS

This is a retrospective study with secondary data from the SINASC of the municipality of Itapema, where this system was implemented in 1990, with total coverage in the study period (2011–2015). Itapema is located on the north coast of Santa Catarina State, covers an area of 58.6 km^2, and has a population of 67,338 inhabitants[7]. On average, it had 707 births per year (2011 to 2015), with deliveries in nearby cities since the municipality does not have maternity wards. It has a health service network with 13 Family Health Strategy working teams and a small municipal hospital[8].

The sample consisted of all DNVs issued in the study period. Data were collected from the Health Surveillance department of the Itapema Municipal Health Secretariat, which provided the SINASC database to the researchers, in csv format.

The DNV comprises eight fillable sections: newborn identification, birthplace, mother, father, pregnancy and childbirth, congenital anomaly, filling data, and registry. This study assessed three of these sections – mother, pregnancy and childbirth, and newborn. The variables selected for evaluation were checked for incompleteness (blank fields) and inaccuracies (mistakes in the filling), according to the DNV filling instructions[2]. Below, we describe the sections, variables, and specific criteria in brackets:

- Section I: newborn identification: sex; birth weight; 1-minute Apgar score (Apgar 1) — values in the 01 to 10 range; 5-minute Apgar score (Apgar 5) — values in the 01 to 10 range; congenital anomaly or defect (malformation) detected;
- Section III: mother: schooling — highest level completed; usual occupation — professions according to the Brazilian Classification of Occupations[2]; age in completed years (age); marital status; ethnicity; neighborhood/district of residence;
- Section V: pregnancy and childbirth: number of previous pregnancies (numeric value related to the number of vaginal deliveries and cesarean sections); number

of vaginal deliveries (numeric value related to the number of previous pregnancies and cesarean sections); number of cesarean sections (numeric value related to the number of previous pregnancies and vaginal deliveries); number of living children (value related to the variables previous pregnancies, vaginal deliveries, and cesarean sections); number of stillbirths/abortions (value related to the variable previous pregnancies); number of gestational weeks (numeric value with two digits); number of prenatal care visits (value within the numeric range, composed of two digits); type of pregnancy; fetal presentation at birth; was the labor induced? (induction); type of delivery; was the cesarean section performed before the start of labor?

As a baseline to categorize incompleteness and inaccuracy, we adopted the classification suggested by Romero and Cunha[5], with the following evaluation levels: excellent (1 to 4.9%), good (5 to 9.9%), regular (10 to 19.9%), poor (20 to 49.9%), and very poor (50% or more).

The Research Ethics Committee of the Universidade do Vale do Itajaí (Univali) approved this study, under number 1,581.149.

RESULTS

This study evaluated 23 fields of 3,537 DNVs, distributed according to the sample years: 607 in 2011, 672 in 2012, 697 in 2013, 728 in 2014, and 833 in 2015.

Table 1 shows the percentages of inadequacies found in the DNVs evaluated. Most inadequacies corresponded to incompleteness. However, the following variables showed no issues throughout the study period: newborn sex, birth weight, maternal age, type of pregnancy, and type of delivery.

The variable "was the cesarean section performed before the start of labor?" stands out, with incompleteness percentages above 10% in 2011, classified as regular; from 2012 to 2014, these percentages reached 40 to 49%, considered poor; and in 2015, it corresponded to 52%, regarded as very poor.

Occupation presented rates above 6%, classified as good, while the neighborhood (between 0.8 and 4.5%) and induction of labor (0.7 to 2.9%) variables were considered excellent for information incompleteness.

The neighborhood field had inaccuracies (0.3 to 1.3%), including names not related to neighborhoods from the studied city.

The incompleteness profile in the period showed a gradual increase between 2011 and 2015, mainly due to the variable "cesarean section was performed before the start of labor". Interestingly, from 2011 to 2012, incompleteness increased in 16 (69.6%) of the 23 variables, while from 2012 to 2013, this increase was detected in only 9 of them (39.1%). In 2014, this number decreased to seven variables, and in 2015, to only three: marital status, ethnicity, and cesarean section prior to labor. Among the 23 variables, 21 were categorized as excellent, one as good, and one as poor (39.4%) when calculating the mean rate of the years

Table 1. Percentage of incompleteness or inaccuracies in constant variables of the Certificate of Live Birth from Itapema, Santa Catarina, from 2011–2015.

Variable	Incompleteness					Inaccuracy				
	2011	2012	2013	2014	2015	2011	2012	2013	2014	2015
Newborn identification										
Sex	0.0	0.0	0.0	0.0	0.0	–	–	–	–	–
Weight	0.0	0.0	0.0	0.0	0.0	–	–	–	–	–
Apgar 1	0.0	0.6	0.7	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Apgar 5	0.0	0.4	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Malformation	0.0	0.1	0.1	0.1	0.0	–	–	–	–	–
Mother										
Schooling	0.0	0.3	0.7	0.3	0.1	–	–	–	–	–
Occupation	7.7	6.7	6.7	7.4	6.2	0.0	0.0	0.0	0.0	0.0
Age	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Marital status	0.0	0.3	0.4	0.4	0.5	–	–	–	–	–
Ethnicity	0.0	0.4	1.1	0.4	1.3	0.0	0.4	0.6	0.5	0.7
Neighborhood	4.1	4.5	3.4	1.6	0.8	1.3	0.4	0.3	0.3	0.4
Pregnancy and childbirth										
No. of prior pregnancies	0.0	0.4	0.3	0.1	0.1	0.0	0.1	0.0	0.0	0.0
No. of vaginal deliveries	0.0	0.4	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0
No. of cesarean sections	0.0	0.4	0.1	0.3	0.1	0.0	0.3	0.0	0.0	0.1
No. of living children	0.2	0.4	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
No. of stillbirths	0.2	0.4	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0
No. of gestational weeks	0.2	0.1	0.4	0.1	0.1	0.0	0.0	0.0	0.0	0.0
No. of prenatal care visits	0.0	0.1	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0
Type of pregnancy	0.0	0.0	0.0	0.0	0.0	–	–	–	–	–
Fetal presentation at birth	0.0	0.3	0.6	0.5	0.4	–	–	–	–	–
Induction of labor	0.0	1.3	2.0	2.9	0.7	–	–	–	–	–
Type of delivery	0.0	0.0	0.0	0.0	0.0	–	–	–	–	–
Cesarean section before labor[a]	10.0	40.5	44.3	49.3	52.9	–	–	–	–	–
Total (%)	22.4	58.0	62.1	64.8	63.7	1.3	1.3	1.0	0.8	1.2

[a]Cesarean section was performed before the start of labor.

evaluated. This percentage of 39.4% refers to the mean rate of the variable cesarean section prior to labor, which corresponded to: 10, 40.5, 44.3, 49.3, and 52.9%.

Only five variables evaluated showed inaccuracies in their percentages: ethnicity, neighborhood, number of previous pregnancies, number of vaginal deliveries, and number of previous cesarean sections, all classified as excellent according to the scale adopted. We also noted an inaccuracy in the variable ethnicity from 2012 to 2015, with the field showing values associated with marital status. The overall inaccuracy classification was excellent for all variables, but the section "pregnancy and childbirth" presented greater incompleteness, and the section "mother" showed more inaccuracies.

DISCUSSION

Scientific studies based on health information systems have the advantage of using population and national bases at low cost. SINASC is an essential tool for knowledge of the epidemiological profile, planning, and evaluation of actions in the field of maternal and infant health[5].

The section "pregnancy and childbirth" presented the greatest rates of incompleteness, in line with a study performed in Pernambuco, in which the maternal reproductive history presented the highest percentage[4], a result also detected by Romero and Cunha[5]. Birth attributes are known to allow greater precision when measuring social inequality and related risks[3].

The variable "cesarean section was performed before the start of labor" has the following options "yes", "no", "not applicable", and "ignored" if the delivery was by cesarean section. Otherwise, the options "not applicable" or "ignored" should be checked[2]. The high percentage of incompleteness in this variable may be related to the fact that, in many hospitals, abdominal delivery has become the standard procedure — Brazil has, currently, one of the highest rates of cesarean sections in the world[9]. Rattner and Moura[10] revealed that, when elective, cesarean sections were mainly performed in working days and daytime shifts, in addition to presenting an increasing trend according to higher maternal age and schooling, above 80% for this type of delivery. We found no studies specifically evaluating this variable, which was included in 2011, after the changes in the DNV model[2].

In the incompleteness analysis, the variable schooling presented rates from 2012 to 2015, but remained classified as excellent and showed no inaccuracies. A large study conducted in Rio de Janeiro[11] presented a high proportion of incompleteness in the system, mainly in the variables ethnicity, maternal schooling, living and dead children, maternal age, and pregnancy duration. Compared to this study, all these variables showed some level of incompleteness, except for maternal age, which showed no incompleteness or inaccuracies in the period. The study by Nunes et al.[6] corroborated this same quality, as the variables related to the mother, such as age (100%), and those associated with the child, such as sex and weight, had excellent completeness in live birth records. In addition to being a necessary variable for studies, maternal age is often used as an important risk factor for low birth weight, just

as the variable birth weight is intrinsically connected to predicting factors for morbidity and mortality and infant survival[5].

In this study, incompleteness regarding maternal occupation was classified as good, with no inaccuracies. A time-series study performed in Rio de Janeiro[11] identified worse completeness for maternal occupation, classified as regular between 1999 and 2014. In Brazilian state capitals[12], this maternal variable was categorized as regular, poor, or very poor in more than half of the studied cities — very poor in Salvador, Goiânia, Natal, and Porto Velho, and poor in nine other cities. This study presented a slight improvement in the percentage of this variable between 2011 and 2012 (from 7.7 to 6.7%), when the DNV model changed, eliminating the need for a code for this variable[2], although keeping undefined the time interval since the woman's last occupation, according to the filling manual[5]. This variable refers to the type of work usually performed by the woman and should be detailed to allow its categorization according to the Brazilian Classification of Occupations; the code is unnecessary, but the field should be completely filled[2].

In the present study, the variable neighborhood showed more than 4% of incompleteness in the first 2 years evaluated, with a progressive reduction in the following years; the same occurred with the inaccuracies for this variable, which presented a higher percentage in 2011. The inaccuracies found corresponded to neighborhoods that were not in the official list of the studied city but existed in the municipal database. Despite the importance of this information, its use has been less common in recent investigations[13,14] involving the analysis of SINASC variables, even though maternal and neonatal epidemiological characteristics are associated with geographical aspects and represent a significant information source[15].

With respect to ethnicity, despite having exclusive options, the 2012–2015 databases presented values associated with marital status in this field. Data related to inaccuracies in this variable were not found in studies; nonetheless, incompleteness, such as the ignored option, was identified in national research following the gradual implementation of the new DNV form in 2011, when the variable was introduced[16]. In another analysis, ethnicity was classified as poor in most cities, particularly in São Luís, where incompleteness reached 36.8%[12]. Research developed in Rio de Janeiro considered this variable poor in 1999, with gradual incompleteness improvement, achieving an excellent rating in 2014[11]. Taking into account the potential role that ethnicity might have in determining maternal health outcomes, a study revealed that obtaining this information is a challenge, as this variable is difficult to collect and interpret given the extensive miscegenation in a population, such as that of Brazil[17]. The persistence of poor filling of sociodemographic variables, such as maternal ethnicity, occupation, and schooling, hinders the analysis of social inequalities related to several women and infant health outcomes.

This study analyzed five years of SINASC data from a municipality in Southern Brazil, and the results showed excellent filling completeness and accuracy for most variables, indicating that the DNV is a promising[18], consistent source, with high data agreement when compared to information collected from maternal and neonatal medical records, as well as record books[19,20]. However, we detected variables that need improvement and monitoring

to raise their quality, especially cesarean section prior to labor, occupation, neighborhood, and induction. The management and health professionals of the municipality received all these data, along with suggestions aiming at enhancing and observing these indicators so they can be used when planning actions and epidemiological research.

REFERENCES

1. Santos JO, Pacheco TS, Oliveira OS, Pinto VL, Gabrielloni MC, Barbieri M. Perfil obstétrico e neonatal de puérperas atendidas em maternidades de São Paulo. J Res Fundam Care Online 2015; 7(1): 1936-45. https://doi.org/10.9789/2175-5361.2015.v7i1.1936-1945
2. Brazil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Departamento de Análise da Situação de Saúde. Manual de Instruções para o preenchimento da Declaração de Nascido Vivo. Brasília: Ministério da Saúde; 2011.
3. Mello-Jorge MHP, Gotlieb SND, Sobol MLMS, Almeida MF, Latorre MRDO. Avaliação do sistema de informação sobre nascidos vivos e o uso de seus dados em epidemiologia e estatísticas de saúde. Rev Saúde Pública 1993; 27(Supl.): 1-46. https://doi.org/10.1590/S0034-89101993000700001
4. Frias PG, Pereira PMH, Vidal AS, Lira PIC. Avaliação da cobertura do Sistema de Informações Sobre Nascidos Vivos e a contribuição das fontes potenciais de notificação do nascimento em dois Municípios de Pernambuco, Brasil. Epidemiol Serv Saúde 2007; 16(2): 93-101. https://doi.org/10.5123/S1679-49742007000200004
5. Romero DE, Cunha CBC. Avaliação da qualidade das variáveis epidemiológicas e demográficas do Sistema de Informações sobre Nascidos Vivos, 2002. Cad Saúde Pública 2007; 23(3): 701-14. https://doi.org/10.1590/S0102-311X2007000300028
6. Nunes FBBF, Prudêncio PS, Carvalho JFS, Mamede FV. Incompletude de informação de nascidos vivos em São Luís/MA no ano de 2012. J Res Fundam Care Online 2016; 8(1): 3705-13. https://doi.org/10.9789/2175-5361.v8i1.3705-3713
7. Instituto Brasileira de Geografia e Estatística. Cidades@ [Internet]. Brasil: Instituto Brasileira de Geografia e Estatística; 2010 [accessed on Oct. 8, 2020]. Available at: https://www.ibge.gov.br/cidades-e-estados/sc/itapema.html
8. Prefeitura de Itapema. Secretaria Municipal de Saúde. Plano Municipal de Saúde de Itapema. Itapema: Prefeitura de Itapema; 2014.
9. Souza JP, Castro CP. Sobre o parto e o nascer: a importância da prevenção quaternária Cad Saúde Pública 2014; 30(Supl.): S11-S13. https://doi.org/10.1590/0102-311XPE02S114
10. Rattner D, Moura EC. Nascimentos no Brasil: associação do tipo de parto com variáveis temporais e sociodemográficas. Rev Bras Saúde Matern Infant 2016; 16(1): 39-47. https://doi.org/10.1590/1806-93042016000100005
11. Lino RRG, Fonseca SC, Kale PL, Flores PVG, Pinheiro RS, Coeli CM. Tendência da incompletude das estatísticas vitais no período neonatal, estado do Rio de Janeiro, 1999-2014. Epidemiol Serv Saúde 2019; 28(2): e2018131. https://doi.org/10.5123/s1679-49742019000200014
12. Maia LTS, Souza WV, Mendes ACG, Silva AGS. Uso do linkage para a melhoria da completude do SIM e do Sinasc nas capitais brasileiras. Rev Saúde Pública 2017; 51: 112. https://doi.org/10.11606/S1518-8787.2017051000431
13. Szwarcwald CL, Leal MC, Pereira APE, Almeida WS, Frias PG, Damacena GN, et al. Avaliação das informações do Sistema de Informações sobre Nascidos Vivos (SINASC), Brasil. Cad Saúde Pública 2019; 35(10): e00214918. https://doi.org/10.1590/0102-311x00214918
14. Pedraza DF. Qualidade do Sistema de Informações sobre Nascidos Vivos (Sinasc): análise crítica da literatura. Ciên Saúde Coletiva 2012; 17(10): 2729-37. https://doi.org/10.1590/S1413-81232012001000021
15. Fernandes KG, Costa ML, Haddad SM, Parpinelli MA, Sousa MH, Cecatti JG. Cor da pele e resultados maternos graves: evidências da Rede Brasileira de Vigilância da Morbidade Materna Grave. BioMed Res Int 2019; 2594343. https://doi.org/10.1155/2019/2594343
16. Henriques LB, Alves EB, Vieira FMSB, Cardoso BB, Angeles ACRD, Cruz OG, et al. Accuracy of gestational age assessment in Brazilian Information System on Live. Cad Saúde Pública 2019; 35(3): e00098918. https://doi.org/10.1590/0102-311x00098918

17. Melo ECP, Carvalho MS, Travassos C. Distribuição espacial da mortalidade por infarto agudo do miocárdio no Município do Rio de Janeiro, Brasil. Cad Saúde Pública 2006; 22(6): 1225-36. https://doi.org/10.1590/S0102-311X2006000600012
18. Marques LJP, Oliveira CM, Bonfim CV. Assessing the completeness and agreement of variables of the Information Systems on Live Births and on Mortality in Recife-PE, Brazil, 2010-2012. Epidemiol Serv Saúde 2016; 25(4): 849-54.
19. Oliveira MM, Andrade SSCA, Dimech GS, Oliveira JCG, Malta DC, Rabello Neto DL, et al. Avaliação do Sistema de Informações sobre Nascidos Vivos. Brasil, 2006 a 2010. Epidemiol Serv Saúde 2015; 24(4): 629-40. https://doi.org/10.5123/S1679-49742015000400005
20. Luquetti DV, Koifman RJ. Qualidade da notificação de anomalias congênitas pelo Sistema de Informações sobre Nascidos Vivos (SINASC): estudo comparativo nos anos 2004 e 2007. Cad Saúde Pública 2010; 26(9): 1756-65. https://doi.org/10.1590/S0102-311X2010000900009

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