Association of fetal and maternal factors with mortality due to diseases and malformations of the circulatory system in children

Thais Rocha Salim; Gabriel Porto Soares; Carlos Henrique Klein; Gláucia Maria Moraes de Oliveira

Federal University of Rio de Janeiro- Instituto do Coração Edson Saad, Rio de Janeiro- Brazil.
University of Vassouras, Vassouras - Brazil

Purpose: To verify the association of characteristics recorded at the time of birth, including weight, occurrence of asphyxia, gestation duration, maternal age and education level with death from diseases and malformations of the circulatory system below the age of 18 years in children born and deceased between 1996 to 2014 in the state of Rio de Janeiro, Brazil

Methods: The databases Information System on Live Births and Information System on Mortality were linked and evaluated following a strategy of longitudinal cohort analysis. We estimated the crude relative risks (RRs) and the RRs adjusted for the variables birth weight, Apgar scores at 1 and 5 minutes, gestation duration, maternal age and education level

Results: We linked 6,380 deaths with 4,282,260 birth records, yielding 5.062 pairs considered true.

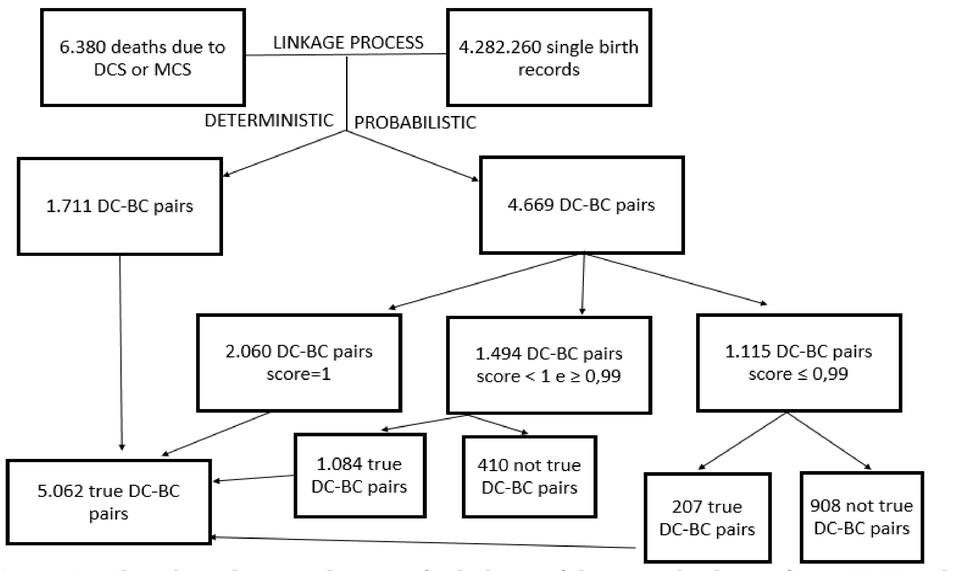

Figure 1 – Flowchart showing the steps for linkage of the pairs death certificate (DC) and birth certificate (BC)

TABLE 1 - Crude and adjusted relative risks of death due to diseases or malformations of the circulatory system relative to the population of live births according to predictive variables in children below the age of 18 years in the state of Rio de Janeiro, from 1996 to 2014

Predictive Variables	DCS N*	MCS N*	Live Births N*	DCS Crude RR	DCS Crude FAP%	DCS Adjusted+ RR	MCS Crude RR	MCS Crude FAP%	MCS Adjusted+ RR
Birthweight									
Adequate	611	2.619	3.715.583	**1**	-	**1**	**1**	-	**1**
Low	196	1.335	342.531	**3,48**	**17,30**	**2,26**	**5,53**	**27,64**	**2,96**
High	34	146	217.069	**0,95**	**-0,26**	**0,96**	**0,95**	**- 0,25**	**0,89**
Apgar 1									
Normal	510	2.046	3.294.362	**1**	-	**1**	**1**	-	**1**
Asphyxia	309	1.927	842.365	**2,37**	**21,80**	**1,73**	**3,68**	**35,31**	**2,10**
Apgar 5									
Normal	709	3.046	3.971.697	**1**	-	**1**	**1**	-	**1**
Asphyxia	104	927	166.137	**3,51**	**9,14**	**1,52**	**7,28**	**20,11**	**2,60**
Gestational Age									
Term	668	2.952	3.876.594	**1**	-	**1**	**1**	-	**1**
Preterm	163	1.076	309.138	**3,06**	**13,20**	**1,49**	**4,57**	**20,85**	**1,40**
Post-term	7	47	49.435	**0,82**	**- 0,22**	**0,86**	**1,25**	**-0,31**	**1,29**
Maternal Age									
20 to 29 years	400	1.957	2.231.102	**1**	-	**1**	**1**	-	**1**
< 20 years	203	772	842.523	**1,34**	**8,6**	**1,17**	**1,04**	**1,21**	**0,93**
30 to34 years	127	677	736.367	**0,96**	**-0,94**	**0,96**	**1,05**	**1,18**	**1,06**
35 to 39 years	73	442	364.377	**1,12**	**1,62**	**1,10**	**1,38**	**5,10**	**1,31**
≥40 years	39	254	95.745	**2,27**	**4,97**	**2,05**	**3,02**	**7,68**	**2,53**
Maternal Education Level									
Higher	102	571	715.828	**1**	-	**1**	**1**	-	**1**
Middle and high	301	1.597	1.625.828	**1,30**	**17,20**	**1,26**	**1,23**	**13,83**	**1,23**
Elementary and no schooling	421	1.842	1.849.316	**1,60**	**30,11**	**1,48**	**1,25**	**15,19**	**1,15**
No information	17	97	85.377	**1,40**	**4,06**	**1,22**	**1,42**	**4,32**	**1,12**

DCS: diseases of the circulatory system (chapter IX of ICD-10); MCS: malformations of the circulatory system (Q20-28 of ICD-10); FAP: fraction attributable to population; * the losses of information on the status of the risk factors were less than 5,5% for this reason pairs in all categories of each variable do not make up the total of true pairs; + adjusted estimates were obtained with models that included all the predictive variables

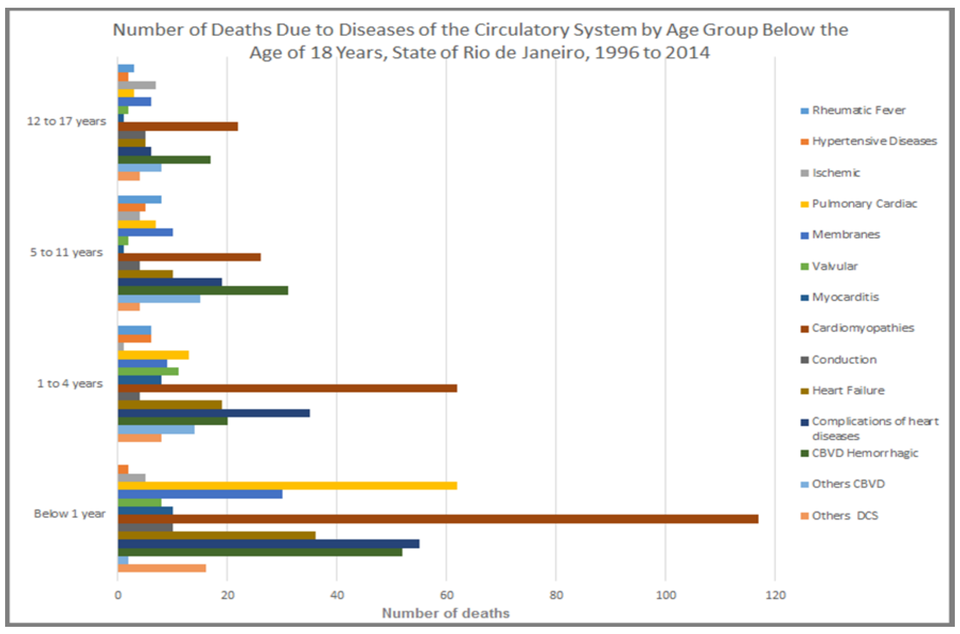

Figure 2 – Number of deaths due to diseases of the circulatory system by age group below the age of 18 years, state of Rio de Janeiro, 1996 to 2014.

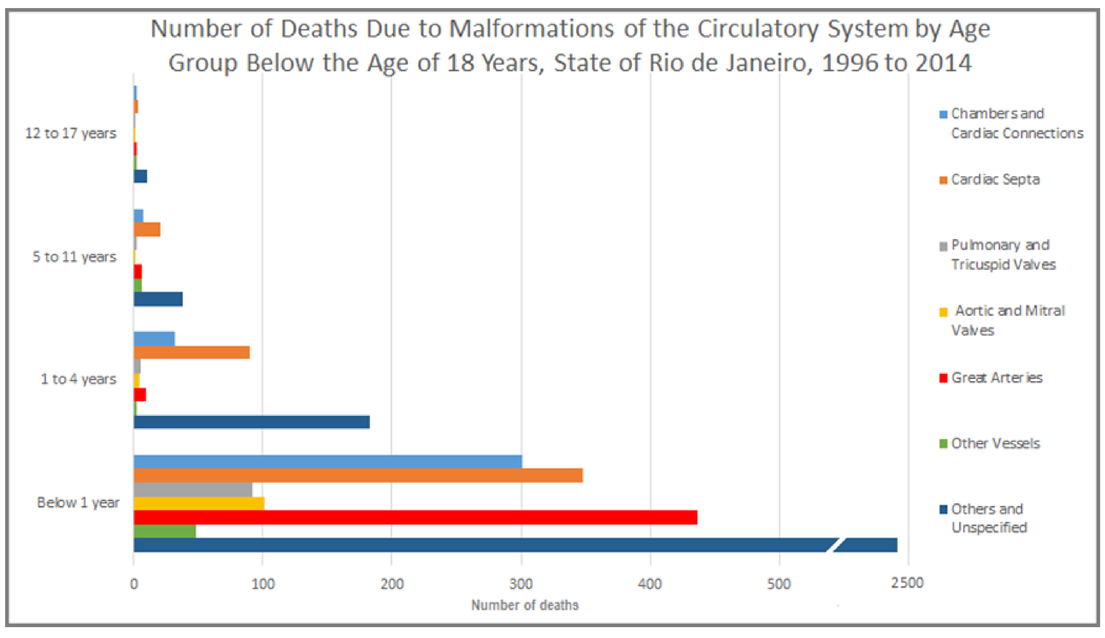

Figure 3 – Number of deaths due to malformations of the circulatory system by age group below the age of 18 years, state of Rio de Janeiro, 1996 to 2014.

Conclusion: Fetal and maternal factors studied were associated with increased mortality due to diseases and malformations of the circulatory system. Measures to control these factors and improve access to their diagnosis and treatment would contribute to reducing the deaths due to diseases and malformations of the circulatory system. However, the identification of environmental influences during gestation and birth on the risk of death should be carefully considered, as they are influenced by genetic factors.