MULTIDISCIPLINARY SCIENTIFIC JOURNAL
NÚCLEO DO CONHECIMENTO
REVISTA CIENTÍFICA MULTIDISCIPLINAR NÚCLEO DO CONHECIMENTO ISSN: 2448-0959
https://www.nucleodoconhecimento.com.br

INFANT DEATHS, FETAL DEATHS AND SHARED OBITUARY CAUSES: IMPLICATIONS AND A NEW ANALYTICAL PERSPECTIVE ON INFANT MORTALITY

ORIGINAL ARTICLE

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RAMALHO JUNIOR, Alvaro. **Infant deaths, fetal deaths and shared obituary causes: implications and a new analytical perspective on infant mortality.** Revista Científica Multidisciplinar Núcleo do Conhecimento. Year. 07, Ed. 06, Vol. 01, p. 164-194. June 2022. ISSN: 2448-0959, Access link: https://www.nucleodoconhecimento.com.br/health/shared-obituary-causes, DOI: 10.32749/nucleodoconhecimento.com.br/health/shared-obituary-causes

ABSTRACT

In the 2018/2019 *biennium,* it was found that about 64% of infant deaths in the State of Espírito Santo, Brazil, resulted from obituary causes common to fetal deaths, qualifying them as typical mutually exclusive events, in which the occurrence of one of them symptomatically excludes the occurrence of the other for the same obituary cause, thus establishing an inexorable relationship of excluding interdependence, inversely associating the occurrences between them. Raising the question about the implications of this relationship in the analytical perspective of the phenomenon of infant mortality, a question that became the guiding principle in the conduct of this work. From which he formulated the objective of analyzing this relationship with a view to revealing the complexity of the phenomenon of infant mortality, bringing to light new elements hitherto unknown. In this sense, as a methodological basis for the empirical analysis,

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focused on the State of Espírito Santo, it formulated a theoretical/conceptual model enabling the simultaneous analysis of the two events, considering them conceptually differentiated, however, interrelated, demonstrating empirically the existence of a cyclical dynamic intrinsic to the phenomenon, sustained by endogenous forces originating from the excluding interdependence relationship, resulting from the sharing of obituary causes between infant and fetal deaths. Hence, in response to the guiding question, it was concluded that there was an urgent need to rethink the analysis of infant mortality, breaking the tradition restricted only to the deaths of children aged 0 to 1 year, at the risk of gross errors in the interpretation of reality. According to the objective outlined, it analyzed the interaction between this endogenous dynamics and exogenous forces emanating from restrictive structural factors (poverty, sanitation, etc.), revealing new elements inherent to the complexity of the phenomenon, such as, for example, on the hybrid action of exogenous and endogenous factors in determining infant mortality rates, among others. Finally, tying together the various points discussed, this work demonstrates the validity of the thesis that identifies in the interaction between fetal deaths and infant deaths from common obituary causes, the origin of autonomous endogenous forces, supporting an endogenous cyclical dynamic, through which it radiates its harmful effects throughout the universe of infant mortality, systematically altering scenarios of reality.

Keywords: Infant mortality, Fetal mortality, Shared obituary causes, Endogenous cyclic dynamics.

1. INTRODUCTION

From the preliminary reading of data collected on the DATASUS/MS platform on infant mortality in the State of Espírito Santo, it was found (average *biennium* 2018/19) that 375 deaths of live births resulted from obituary causes common to fetal deaths, corresponding to 64% of all infant deaths. At the same time, it was

found that all obituary causes of fetal deaths, without exception, (diseases, diseases, congenital anomalies, etc.) also caused deaths of live births. That is, a total of 862 deaths (375 deaths of live births and 487 fetal deaths) resulted from the same common obituary causes, corresponding to 80% of the 1,080 fetal and infant deaths that occurred, undoubtedly a frightening number of deaths caused by the same causal factors.

More important than the expressive number in absolute terms, is the fact that, by sharing the same obituary causes, fetal deaths and infant deaths assume the condition of “mutually exclusive events”, in which the occurrence of one of them, symptomatically implies the “no occurrence” of the other, for the same obituary cause, since this one is only lethal; or before, or after birth. If before, causing fetal death; if later, the death of a live newborn.

From this bond, a natural and inexorable relationship is established between the occurrence of the two events, characterizing what can be called a relationship of excluding interdependence, in which the occurrence, for example, of a fetal death, symptomatically excludes the possibility of occurrence of an infant death from the same obituary cause. On the other hand, the occurrence of an infant death resulting from a certain shared obituary cause implies the non-occurrence of a fetal death, since the obituary cause ceased to be lethal during the gestational period, coming to manifest itself as such after the birth of the child, causing infant death.

It is worth noting that this is not an inverse probabilistic cause/effect dependence relationship; that is, that the occurrence of one of the events depends on the non-occurrence of the other, but on an inverse association of “post-facto exclusion”, in the condition of mutually exclusive events; that is, the occurrence of one of the events, excludes the occurrence of the other, in this case, by the same obituary cause.

Given the numerical expressiveness and the interdependence relations that are established naturally and inexorably between the two events, it would be reasonable to suppose that such specificities would somehow have implications for the analytical perspective of the phenomenon of infant mortality as a whole.

In search of answers, after extensive bibliographic research on the main digital health platforms: *SciELO,* Virtual Health Library, consultation of Ministry of Health (MS) manuals, academic theses, etc, no study on the interrelationships was found between the two events; in fact, not even mentioned, even if in passing, demonstrating total disinterest, or lack of knowledge on the subject.

More than that, the lack of interest in analysis was evident even in the subject of fetal mortality in general, as the Ministry of Health itself recognizes:

> Com relação à mortalidade fetal, são poucos os estudos e análises disponíveis na literatura e estatísticas brasileiras, reflexo da baixa visibilidade, interesse e compreensão de que esse evento é, em grande parte, prevenível por ações dos serviços de saúde e, ainda, da baixa qualidade da informação. (BRASIL; Ministério da Saúde, 2009; p. 13)

Reinforcing this finding, Florêncio, et al. (2021), in an extensive bibliographic research carried out with the objective of identifying the factors associated with infant mortality most cited in studies prepared by the most diverse authors (total of 5,716 articles), focusing on various regions of the country, found that prematurity, low birth weight, maternal schooling and congenital malformation would be the most relevant factors associated with infant mortality.

On the other hand, Barbeiro et al. (2015), carried out extensive research with the same objective, but focusing on the case of fetal mortality (526 studies consulted), noting that the main factors cited associated with fetal death were inadequate or absent prenatal care, low education and maternal morbidity and history unfavorable maternal reproduction.

In a brief passage of her research, the author makes the following observation:

> Nos países em desenvolvimento, o óbito fetal, apesar de ter influência das mesmas circunstâncias e etiologias que a mortalidade neonatal precoce, ainda é pouco pesquisado.(BARBEIRO et al.; 2015; p 52)

From this brief comment, it can be inferred that, even recognizing the sharing of obituary causes between fetal deaths and newborn deaths, this has not been enough to arouse researchers' interest in the possible implications resulting from this sharing.

There is certainly no lack of knowledge regarding the sharing of obituary causes between the two events, which, on the contrary, is supposed to be too well known. What is unknown, in fact, is the natural and inexorable link between the two events and the resulting interrelations.

More than that, the research of the authors mentioned above shows the immense amount of works/studies analyzing infant mortality and fetal mortality separately, as if they were two independent segments, without any link, which explains, in part, the lack of interest or lack of knowledge and, consequently, the lack of studies addressing issues related to the sharing of common obituary causes between the two events, much less about the resulting implications.

In the midst of this tradition, the indiscriminate use of the IMR (Infant Mortality Rate) as an isolated and only reference parameter in general analyzes on the subject has become equally traditional, as if it were sufficiently adequate to portray the reality of the phenomenon, as if it were a homogeneous segment, regardless of the origin of the obituary causes, in the analytical perspective.

This tradition inexplicably prevails to this day, as evidenced by a recent study, published in October 2021, by the Ministry of Health itself, prepared by the Health Surveillance Department, analyzing the evolution of infant mortality in Brazil, Major

Regions and States, based solely on the behavior of the TMI (BRASIL; Ministério da Saúde, 2021).

In view of all this, the motivation to develop the present work arose naturally, and then the basic guiding question for its conduct was defined, which can be summarized in the following terms: "what would be the implications, in the analytical perspective of the phenomenon of infant mortality resulting from the sharing common obituary causes between fetal and infant deaths"?

Now, the search for answers to this question necessarily implied advancing in an area that was still unexplored, or even unknown, as verified through the bibliographic research, thus leading to the definition of an objective with greater pretensions; that is, "to assess the interrelationships resulting from the sharing of common obituary causes between infant deaths and fetal deaths, with a view to unveiling the complexity of the phenomenon of infant mortality, bringing to light new elements hitherto unknown or neglected in terms of their relevance".

This is a generic objective, but justifiable, because, given the lack of studies/research on the subject discussed here, therefore, without being able to evaluate the state of the arts, posing as a challenge the "search for the new" in the midst of an unexplored scenario. In this sense, the objective outlined brings an explicit commitment to go beyond the answer to the guiding question of evaluating the implications of the interrelationships between the two events, not only in the analytical perspective of the phenomenon, but also to advance in the evaluation of these interrelationships from the perspective of revealing the complexity inherent to the phenomenon, revealing aspects that are still unknown or insufficiently explored.

From the perspective of the "search for the new", an empirical analysis was developed focusing on the State of Espírito Santo, Brazil, as a case study, using only data from the Mortality Information System - SIM -, and the Birth Information

System - SINASC -, both from the Ministry of Health, made available to the general public through the DATASUS/MS Platform, covering the period from 1996 to 2019.

Thus, it empirically demonstrated the existence of a dynamic inherent to the phenomenon of infant mortality that emerges from endogenous forces emanating from the excluding interdependence relations established, naturally and inexorably, as a result of the sharing of common obituary causes between fetal and infant deaths. In real terms, this endogenous dynamic is manifested through the parallel evolution of the annual relative variations of infant mortality and fetal mortality rates, forming opposite cycles of short duration (3/4 years) that reproduce themselves continuously over time, characterizing what here it was called the endogenous cyclical dynamics of short-term opposite cycles.

The realization of this endogenous cyclical dynamics highlights the urgent need to rethink, from an analytical perspective, the conception of infant mortality in the context of a broader universe, including fetal deaths, together with infant deaths as component segments of a single and the same universe and closely related. In this context, it is of fundamental importance to recognize the segment of shared obituary causes, consisting of fetal deaths and infant deaths resulting from common obituary causes, since it is from this segment that endogenous forces emerge, reverberating throughout the universe of infant mortality, radically altering the understanding of the phenomenon.

It makes no sense to analyze infant mortality as if it were an isolated segment, making it necessary to break with the tradition of a conception, restricted only to the deaths of live-born children, who died before completing 1 year of life, as if were independent events, without any influence on fetal deaths. This also implies the urgent need to overcome the old tradition, still predominant, of having the Infant Mortality Rate - IMR, as an isolated reference parameter in the analysis of the phenomenon, at the risk of incurring gross errors with distorted interpretations of the reality.

The existence of the endogenous cyclical dynamics and its implications in the analytical perspective of the phenomenon was verified, according to the proposed objective of analyzing the sharing of obituary causes between the two events, in a broader perspective, in the sense of revealing new facets of the phenomenon of infant mortality inherent to the its complexity, still unknown or neglected in terms of its relevance.

In this perspective, the work inserted the assumption of the presence of structural factors (poverty level, sanitation, housing, etc.), considered, until then, almost unanimously, as sovereign in the determination of infant mortality rates, analyzing the interaction between the exogenous forces emanating from such factors and the endogenous cyclical dynamics, reaching extremely relevant results. Among these, the conclusion that infant mortality rates are determined by the hybrid action of exogenous forces, emanating from restrictive structural factors, together with endogenous forces, emanating from the short-term cyclical dynamics, putting in “check” the almost unanimity on the sovereignty of structural factors in determining these rates.

From this analysis, it was also concluded that any change in the level of infant mortality necessarily passes through the intermediation of the short-term endogenous cyclical dynamics, this dynamic being the defining instance of the intensity of the final effect on the level of infant mortality.

Having made this brief indicative explanation of some of the results and given the lack of studies and general lack of interest in the subject addressed here, this work has much to contribute, drawing the attention of those who militate in the area of child health about the relevance of several aspects that are still unknown or neglected, fundamental to advance in the analysis and knowledge of the phenomenon of infant mortality. The dissemination of this work is the certainty of the end of the lack of interest in the matter.

In this sense, the demonstration of the indisputable relevance of the segment of deaths from common obituary causes, hitherto unnoticed, stands out, especially regarding the excluding interdependence relationship that is established within this segment, creating an inexorable link between fetal deaths and infant deaths by common obituary causes, affecting the entire universe of infant mortality, revealing a scenario hitherto unknown, involved by an endogenous cyclical dynamic.

In addition to this introduction, the development of the work is structured in three sections: Methodology, Results and Final Considerations. The first, Methodology, presents the conception and formal structure of the theoretical/conceptual model, based on which the empirical analysis focused on the State of Espírito Santo was developed as a case study. It is worth noting that this model was originally developed here in view of the need to simultaneously analyze fetal deaths and infant deaths, as two conceptually differentiated events, however, closely interrelated, thus making it possible to assess their links and implications.

The next section, Results, presents the development of the empirical analysis, its results and conclusions. The highlight of this section is mainly due to the empirical demonstration of the existence of the endogenous cyclical dynamics of the short-term opposite cycles as intrinsic to the complexity of the phenomenon of infant mortality.

The work ends with the section “Final Considerations”, where a synthesis of the main results and conclusions derived from the empirical analysis is made, including highlighting the final conclusion related to the answer to the guiding question formulated as the guiding principle of the entire work.

of the work, followed by reflections on the contributions of these results, in the analytical perspective, as well as in the perspective of advancing in new knowledge about the complexity of the phenomenon of infant mortality.

2. METHODOLOGY

2.1 THE STATE OF ESPÍRITO SANTO AS A CASE STUDY OF EMPIRICAL ANALYSIS

The empirical analysis focuses on the State of Espírito Santo as a case study, using only secondary data from the Live Birth Information System (SINASC) and the Mortality Information System (SIM), for the period from 1996 to 2019, both linked to the Ministry of Health, made available for public consultation on the DATASUS/MS Platform.

Despite the well-known criticisms about the quality of this information, particularly in relation to fetal deaths, these data were used, due to their annual availability, covering a long period of time and at the level of municipalities, which allows the identification of missing and/or distorted data, making it possible to choose by adjustments, when feasible, or exclusion, thus seeking to minimize, as far as possible, distortions in the results.

According to the guiding question of the work and the objective outlined, the empirical analysis developed here aims to identify implications, still unknown, arising from a real fact found. It differs, therefore, from the procedures of empirical analysis in general, which aims to demonstrate empirically the validity or not of a certain pre-established hypothesis, even because this would be practically impossible, given the lack of studies/theories on the issue under analysis.

2.2 FORMULATION OF THE CONCEPTUAL THEORETICAL MODEL

Given the lack of previous reference studies/works, the challenge ahead was the formulation of a specific methodology that would allow the simultaneous analysis of fetal deaths and infant deaths, as two conceptually differentiated events, however, closely interrelated, therefore, inseparable analytically. In this sense, a specific

theoretical/conceptual model was designed as a basis for the empirical analysis, as described below.

As the variations in the two events are expressed, in the real plane, through variations in the respective mortality rates, these were defined as the basic variables of the model; ie:

a) IMR: Infant mortality rate per thousand pregnancies

In the model, the IMR will be defined by 1,000 pregnancies, and not by 1,000 live births, as is traditionally the case. So, the calculation formula will be,

IMR = [(Total deaths in children < 1 year) / (Total pregnancies)] x 1,000.

Where: Total pregnancies = total live births + total fetal deaths.

In the case of the traditional calculation, the IMR is expressed per thousand live births, that is:

IMR = [(Total infant deaths < 1 year) / (Total live births)] x 1,000.

This change in the calculation will have little influence on the values, as will be seen. However, this procedure is necessary to standardize the IMR measurement in relation to the TMFET, which is also expressed per thousand pregnancies.

It should be noted that the object of study is focused on the analysis of the interrelationships between fetal deaths and infant deaths from shared causes, and the IMR refers to the total number of infant deaths, also including, in addition to infant deaths from shared causes, the infant deaths from unshared causes. However, the option to use IMR in the model is justified for two reasons. First, due to the fact that variations in IMR are mostly due to variations in deaths from shared causes, since they represent about 65% of all infant deaths. Second, and more importantly, is that the option for the IMR makes it possible to assess limitations in

the current use of this rate as an isolated parameter to analyze the phenomenon of mortality, as traditionally occurs, at the risk of incurring gross errors, in the misunderstanding of reality.

b) TMFET: Fetal Mortality Rate per thousand pregnancies:

TMFET = [(Total fetal deaths) / (Total pregnancies)] x 1,000.

Fetal death is what occurs in the gestational period, from the 22nd complete week of gestation, or fetuses weighing 500g or more. A fetal death is characterized when, after separation from the mother's body, the fetus does not show any vital signs of life, such as breathing, heartbeat, pulse of the umbilical cord or muscle movement without stimulation, entering the TMFET calculation. If any of these signs are present, no matter how minimally they die soon afterwards, the death of a live-born child is characterized and, as such, it will be included in the calculation of the infant mortality rate -IMR.

In other words, it is a fine line that conceptually differentiates the two events, but which, at the same time, means a close link between the two events, with significant analytical implications, as will be seen in the course of this work.

c) TMI-AMP → Expanded infant mortality rate.

IMR-AMP = [(Total deaths) / (Total pregnancies)] x 1,000; being:

Total deaths = total deaths of children < 1 year + total fetal deaths.

In the design of the model, the TMI-AMP is defined as the variable that expresses the net result of the comparison of the relative variations between TMI and TMFET. Thus, the basic equation of the model is formally defined:

Δ%TMI-AMP = f(Δ%TMINV ; Δ%TMFET), where:

∆%IMR = percentage change in IMR in a given period.

∆%TMFET= percentage change in TMFET in the same period.

The relative variations of the rates are determined by the respective “annual percentage change indices” (IVPA) which corresponds to the relative variation of the value of the respective rate from one year to another.

It is worth noting that the “extended” name of the TMI-AMP refers to the infant mortality rate determined from the comparison of the relative variations between the two rates, TMI and TMFET, and should not be interpreted as a “substitute parameter” of the TMI , in its conception restricted to infant deaths of live births, especially because such a claim was not even considered here.

3. RESULTS

3.1 RELEVANCE OF THE SHARED OBITUARY CAUSES SEGMENT

3.1.1 CHANGES IN THE RELATIVE COMPOSITION OF THE SEGMENT AND MORTALITY RATES

Table 1 presents selected data referring to the State of Espírito Santo (averages for the 2018/2019 *biennium)* identifying specific obituary causes common to fetal and newborn deaths, according to the classification of the "CID-10 Mortality List", also available on the DATASUS/MS Platform. These data portray some of the elements of the "infant mortality universe", from the perspective of obituary causes. According to the data in the table, there were a total of 1,080 deaths in the state, of which 487 (45%) were fetal deaths and 593 (55%) were infant deaths of children up to 1 year of age. In the latter, two segments differentiated by obituary causes are identified; that is, infant deaths from causes common to fetal deaths and deaths from non-shared cause.

Of the 593 infant deaths, 375 (63.34%) resulted from obituary causes common to fetal deaths, and another 218 (36.7%) resulted from non-shared causes (eg, hospital infection, accidents, and various external causes). Given that all obituary causes of fetal deaths, without exception, represent potential causal factors of infant deaths, the sum of the total of fetal deaths and infant deaths from common causes constitutes a specific obituary segment of this universe, bringing together all the resulting deaths of the same obituary causes, here called "*shared causes obituary segment*". This segment therefore totals 862 deaths (or 80% of the total of 1080 deaths), 56% of which refer to fetal deaths (487 deaths) and 44% to infant deaths (375 deaths).

As deaths resulting from the same obituary causes, and given the fine line that separates the two concepts, the relative composition of this segment would be

subject to systematic variations, all depending solely on the moment in which the lethality of the causal factors would manifest more intensely; whether before, or after birth, this being a random fact, out of control.

TABELA 1 MORTALIDADE INFANTIL - ESTADO DO ESPIRITO SANTO
ÓBITOS FETAIS E ÓBITOS DE NASCIDOS VIVOS - CAUSAS OBITUÁRIAS COMUNS - LISTA MORT CID 10
OCORRÊNCIAS - DADOS MÉDIOS BIENIO 2018/2019

DISCRIMINAÇÃO	ÓBITOS FETAIS		ÓBITOS NASCIDOS VIVOS	
	OCORRENCIAS	%	OCORRENCIAS	%
Algumas doenças infecciosas e parasitárias	**1**	**0,21**	**15,5**	**2,61**
. Restante de algumas doenças infecciosas e parasitárias	1	0,21	4,5	0,76
Algumas afecções originadas no período perinatal	**456,5**	**93,74**	**200**	**33,73**
. Feto e recém-nascido afetados por fatores maternos	326,5	67,04	102,5	17,28
. Transtornos relacionados à duração da gravidez	2,5	0,51	18,5	3,12
. Traumatismo ocorrido durante o nascimento	0,5	0,1	0,5	0,08
. Hipóxia intrauterina e asfixia ao nascer	89	18,28	26	4,38
. Transtornos hemorrágicos e hematológicos do feto	2	0,41	6	1,01
. Restante das afecções perinatais	36	7,39	46	7,76
Malformações congênitas, deformidades e anomalias	**29,5**	**6,06**	**160,5**	**27,07**
. Hidrocefalia e espinha bífida congênitas	0,5	0,1	4	0,67
. Outras malformações congênitas do sistema nervos	5	1,03	17	2,87
. Malformações congênitas do coração	3	0,62	49,5	8,35
. Outras malformações congênitas do aparelho circu	0,5	0,1	9	1,52
. Síndrome de Down e outras anomalias cromossômica	3	0,62	20,5	3,46
. Outras malformações congênitas	17,5	3,59	60,5	10,2
SUB TOTAL CAUSAS COMUNS	487	100	375	63,24
SUB TOTAL CAUSAS NÃO COMUNS	0	0	218	36,76
TOTAL	487	100	593	100

FONTE: Dados originais SIM/SINASC/MS/BR, Plataforma DATASUS/MS
ELABORAÇÃO DO AUTOR

In these circumstances, many of the causes that manifested themselves as lethal before birth, causing 487 fetal deaths, could perfectly manifest themselves as such, after birth, increasing infant deaths and, on the other hand, reducing fetal deaths.

In the extreme, it would not be incorrect to state that the 375 infant deaths in this segment occurred due to the non-manifestation of the lethality of these causal factors during the gestational period, becoming lethal after birth. In other words, the 375 infant deaths were a “consequence” of the non-occurrence of 375 fetal deaths.

Although the total number of deaths from shared causes remains the same (862 deaths), the change in the relative composition of these deaths has analytical implications of the greatest relevance regarding the variability of infant (IMR) and fetal mortality (TMFET) rates.

That is, the more intense manifestation of the lethality of causal obituary factors before birth, causing an increase in fetal deaths and, on the other hand, a reduction in infant deaths, altering the relative composition of the obituary segment of shared causes, implies an increase in TMFET, concomitantly to the reduction of the IMR. If the lethal power of the causal factors manifests itself with less intensity during the gestational period, it would result in a decrease in TMFET, concomitant with an increase in IMR. Therefore, just as the shared relative composition of deaths from obituary causes would be subject to systematic changes, the IMR and TMFET rates would be subject to opposite variations, also systematic.

In order to better clarify this issue, an illustrative hypothetical numerical example is presented below. Taking as an initial reference the data in Table 1, for Espírito Santo (2018/19 averages), assume that the lethality of certain causal factors manifested itself more intensely in the gestational period, causing 100 more fetal deaths, from 487 to 587 the total of fetal deaths. On the other hand, in the condition of mutually exclusive events, it would imply a lower occurrence of infant deaths in equal numbers, since the lethality of such causal factors would no longer manifest itself after birth. Infant deaths from shared obituary causes would reduce from 375 to 275 deaths.

As a result, the relative composition of deaths from common causes, which was 487 fetal deaths (56%) and 375 infant deaths (44%) out of a total of 862, would change to 68% of fetal deaths (587 occurrences) and 32% of infant deaths (275), in relation to the same total of occurrences (862), which would naturally change the respective mortality rates.

Table 2 shows the changes in the universe of infant mortality, resulting from the change in the proportions of fetal and infant deaths in the obituary segment for shared causes.

TABELA 2 - MORTALIDADE INFANTIL E FETAL
DADOS SELECIONADOS
EXEMPLO ILUSTRATIVO

VARIAVEIS	ANO 18/19-MEDIA	ALTERAÇÃO (HIPOTESE)
OBITOS FETAIS	487	587
OB. NASC. VIVOS	593	493
OB. N.VIVOS CAUSAS COMUNS	375	275
TOTAL OB. CAUSAS COMUNS	862	862
OB. NVIVOS CAUS. NÃO COM	218	218
OB TOTAIS	1080	1080
TOTAL NASC. VIVOS	55823	55723
TOTAL GESTAÇÕES	56310	56310
PARAMETROS - TAXAS		
TMI-AMP	19,18	19,18
TMI (por 1.000 gestações)	10,53	8,76
TMFET	8,65	10,42
TMI (por 1.000 nascidos vivos))	10,62	8,85

FONTE: Dados extraídos da Tabela 1

Elaboração do autor

- The reduction of 100 infant deaths from shared obituary causes, results in a decrease in the IMR infant mortality rate (including deaths from non-shared causes) from 10.53‰ to 8.76‰ (per 1000 pregnancies), a reduction equivalent to 16.8%. Meanwhile, an increase of 100 fetal deaths results in an increase in TMFET equivalent to 20%, increasing this rate from 8.65‰ to 10.42‰ (per 1000 pregnancies).

- This clearly shows how the variations in infant mortality rates (IMR) and fetal mortality rates (TMFET) are sensitive to changes in the relative composition of the segment of deaths from shared causes; alterations that, as mentioned, would be subject to systematic and significant changes, due to the “thin line” that separates the two concepts and the randomness of the moment when the causal factor manifests itself as lethal. This implies that the TMI and TMFET rates would also be subject to systematic and significant variations, in this case, however, manifesting themselves through inverse parallel variations (increase/decrease).

- Changes in the relative composition of deaths in the obituary segment due to shared causes, although resulting in inverse variations between TMI and TMFET, do not imply any change in the levels of infant mortality, as the lethal power of the causal factors would remain active, causing the same number of deaths (862 deaths), only, in this case, manifesting itself more intensely before the child's birth;

- Taking advantage of the results of this hypothetical example, it is possible to clarify once and for all the limitations of the IMR, when used alone as a reference parameter to analyze the phenomenon of infant mortality. In fact, based solely on the IMR, its drop from 10.53‰ to 8.76‰ would probably, as usually happens, be celebrated as if it indicated an effective reduction of 16% in the level of infant mortality, not least because the The number of infant deaths decreased from 593 to 493. However, in fact, there would be nothing to celebrate, since the reduction in infant deaths would be a consequence of the increase in fetal deaths, due to the lethality of certain obituary factors having manifested itself before birth , eliminating the risk of infant death after the child is born. In the example, the decrease in the IMR would be fully offset by the increase in the TMFET, since, as shown in Table 2, the IMR-AMP, which expresses the net result of the relative variations between the two rates, would remain unchanged, remaining at 19.18 deaths per thousand pregnancies; ie of the total number of deaths would remain unchanged, with 1080 occurrences. Anyway, whatever the circumstances, the analysis of infant mortality

based solely on the IMR, the risk of gross errors in the interpretation of the facts would be imminent.

- Before concluding this section, it is opportune here to make an additional observation regarding the proximity of the IMR values expressed per thousand pregnancies and the IMR expressed per thousand live births (last line of Table 2). In other words, when using the IMR expressed per thousand pregnancies in the model as a necessary procedure for its standardization in relation to the TMFET, this change would be irrelevant, in no way influencing the interpretation of the results.

3.1.2 INTERACTION OF THE COMPONENTS OF THE OBITUARY SEGMENT OF SHARED CAUSES

By bringing together all deaths, fetal and infant, from common obituary causes, it is in this segment that the interaction between the two events takes place as mutually exclusive. It is from this interaction that powerful endogenous forces emerge that will radiate their effects throughout the universe of infant mortality.

The condition of mutually exclusive events establishes an inexorable link, inversely associating fetal deaths and infant deaths from common obituary causes, in which the occurrence of one of the deaths would be associated with the non-occurrence of the other. That is, the occurrence of a fetal death would be associated with the non-occurrence of infant death from the same obituary cause, since it excludes any possibility of infant death from the same obituary cause. On the other hand, the occurrence of an infant death due to a certain common cause would be associated with the non-occurrence of a fetal death, since the causal factor did not manifest itself lethal before birth, “avoiding” a fetal death, coming to manifest itself as such after the birth of the child, causing, on the other hand, the infant's death.

Finally, this inverse association between fetal and infant deaths from common obituary causes is a fact that emerges naturally and inexorably, as they are two mutually exclusive events, characterizing, therefore, endogenous forces that arise spontaneously, regardless of exogenous stimuli. The necessary and sufficient condition for them to be activated is the occurrence of infant deaths from obituary causes common to fetal deaths, no matter how small the number of such occurrences. Obviously, the intensity of these endogenous forces will be greater the greater the number of these occurrences, and, consequently, the power of irradiating their effects throughout the universe of infant mortality.

Finally, these endogenous forces establish a link between the two events, here called “relationship of excluding interdependence”, as a reference to their inexorability as they are mutually exclusive events. That is, the occurrence of one of the deaths, symptomatically excludes the occurrence of the other. This relationship of interdependence will be permanent as long as infant deaths from shared obituary causes occur.

In the real world, this excluding interdependence relationship will be crystallized through inverse variations between the TMI and TMFET rates, evolving over time, forming opposite parallel cycles, as will be empirically demonstrated in the following section.

3.2 ENDOGENOUS CYCLIC DYNAMICS

After this brief explanation of concepts and definitions, the work advances in the empirical analysis of data referring to the State of Espírito Santo, initially with the objective of evaluating the behavior of infant mortality rates (IMR) and fetal mortality rates (TMFET), over the period 1996/2019.

Graph 1 presents the projections of the “annual percentage variation indices” – IVPA, for the respective rates over the period, immediately showing the great

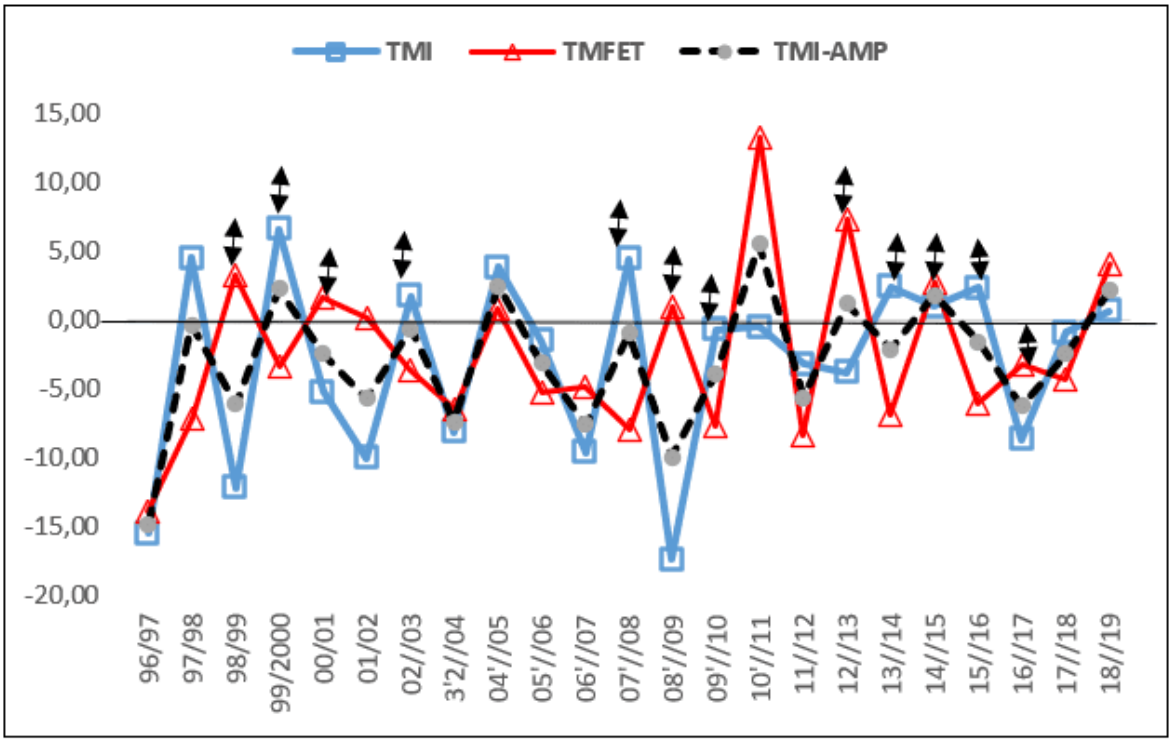
predominance of inverse variations (increase/decrease) between the IMR and TMFET rates, practically each year, resulting in the formation of opposite parallel cycles of short duration (average of 3 to 4 years), which are repeated sequentially, inverting the direction of the variations, alternating the “peak/floor” position with each cyclic movement. The two-way arrows identify 12 short opposite cycles in the period, combining parallel cyclic movements in which the “peak/floor” positions are inverted with each cycle.

This behavior of the two rates, forming parallel and opposite cycles, reflects the relations of exclusive interdependence between fetal deaths and infant deaths from shared causes, inversely associating the occurrences between the two events.

Since the relationships of interdependence originate from endogenous forces that emerge spontaneously due to the condition of two mutually exclusive events, it means that the cyclic evolution of the TMI and TMFET rates, forming opposite parallel cycles of short duration, is configured as an endogenous cyclical dynamic, here called of “endogenous cyclical dynamics of opposite short-term cycles”.

In summary, the behavior of the rates, TMI and TMFET, forming short parallel and opposite repetitive cycles over time, translates, in the real plane, the presence of an endogenous dynamic process intrinsic to the phenomenon of infant mortality, here called “dynamics endogenous cyclical pattern of opposite short-term cycles”.

Graph 1 - State of Espírito Santo - Infant mortality: annual percentage change indices of mortality rates TMI - TMFET - TMI - AMP: period (1996/2019).



Source: basic data: sim/sinasc/ms /datasus. Author's elaboration.

Graph 1 also presents the projection of the behavior of the TMI-AMP over the period, noting that the representative line of the trajectory of this rate is between the trajectories of TMI and TMFET, which is to be expected, given that, according to with the conception of the theoretical/conceptual model, the TMI-AMP expresses the net result of the comparison of the relative variations between the two component rates of the endogenous cyclical dynamics, TMI and TMFET.

The intensity with which this cyclic dynamic manifests itself reflects the radiating power of endogenous forces, originating from the inverse relationship between fetal deaths and infant deaths from shared causes, throughout the universe of infant mortality. The more expressive the number of deaths recorded in the obituary segment of shared causes, the more intense will be the manifestation of

endogenous forces and, consequently, their radiating power, which will be spread throughout the universe of infant mortality, through the short-term endogenous cyclical dynamics, also, more intense.

The greater intensity of this dynamic is crystallized, in the real plane, through the greater “peak/floor” differential of the short-term parallel opposite cycles of the relative variations between IMR and TMFET.

On the one hand, the annual intermittent inverse variations between the two rates are related to changes in the occurrences between fetal deaths and infant deaths from common causes, resulting from the moment in which the lethality of causal factors manifests, altering the relative composition of the two events in the obituary segment for shared causes, as seen above.

Meanwhile, the “peak/floor” differential of the short-term opposite cycles between the two rates is related to the intensity with which the endogenous forces arising from the interaction of occurrences between fetal and infant deaths from common causes are manifested.

However, although sustained by endogenous forces, the manifestation of short-term cyclical dynamics is conditioned by exogenous forces originating from the presence of conditioning structural factors. This is the subject of the next section.

3.3 ENDOGENOUS CYCLIC DYNAMICS AND CONDITIONING STRUCTURAL FACTORS

The conditioning structural factors concern issues related to “socio-economic” problems (poverty, housing, income, culture, etc.); of “basic infrastructure” (urban/housing sanitation, accessibility to quality health services, education, community living, etc).

Now, we all know that infant mortality is directly related to these structural factors; that is, the higher the level of poverty, or the more precarious the basic sanitation, the higher the level of infant mortality in a region. Therefore, there is a certain consensus that these factors explain the persistence of high infant mortality rates and that their effective reduction will only be possible with the overcoming of these restrictive structural factors. From there, the assumption was formulated, which came to be accepted, almost unanimously, that such structural factors would be "sovereign" in determining infant mortality rates.

However, in view of the existence of the endogenous cyclical dynamics inherent to the phenomenon of infant mortality, which implies systematic and permanent variations over time in infant mortality rates (IMR) and fetal mortality rates (TMFET), the work progressed towards to analyze the interaction between exogenous forces, emanating from restrictive structural factors, and endogenous forces, emanating from the cyclical dynamics of opposite short-term cycles.

3.3.1 STRUCTURAL FACTORS AND INTENSITY OF ENDOGENOUS CYCLIC DYNAMICS

The set of these structural factors forms what can be called the "*conditioning structural base*", imposing restrictions on the fall in infant mortality rates, at levels in line with the presence of structural factors specific to each reality (country, region, state, municipality, community, etc.). As seen, as long as infant deaths occur from causes common to fetal deaths, endogenous forces will be activated and, consequently, the cyclic dynamics of short-term opposite cycles would manifest, whatever the prevailing structural conditioning base. Hence, the interaction between endogenous forces and exogenous forces would be inevitable, making the analysis of this interaction of fundamental importance to unravel the phenomenon of infant mortality in its complexity.

In this sense, the first point to highlight is that, theoretically, the conditioning structural factors are generally considered to be rigid (or fixed) in the short term, subject to changes only in the medium or long term (for example, reduction of poverty or improvement in the education of the population, or in child health care services).

Now, given the immutability of these structural factors in the short term, what, then, would explain the great variability of annual infant mortality rates as shown in Graph 1, presented above?

Given the immutability in the short term of the vast majority of structural factors, it is reasonable to assume that the conditioning structural base remains equally immutable in the short term, as well as the restrictions imposed by it. That is, in the period in which the same conditioning structural base prevails, the variability of the TMI and TMFET rates would be due to the endogenous cyclical dynamics of short-term cycles, however, such variability being restricted to the limits imposed by the structural base then in force, since endogenous forces are not enough to overcome them.

This scenario would only change in the medium term horizon, when structural factors (improvement in basic sanitation, for example) are overcome enough to establish a new conditioning structural base, now less restrictive, imposing limits on the reduction of infant mortality rates to lower levels.

Overcoming structural factors presupposes a reduction in fetal deaths and infant deaths from common obituary causes, resulting, therefore, in the reduction of endogenous forces and, consequently, less intensity of the short-term endogenous cyclical dynamics, crystallizing in the real plane , by reducing the “peak/floor” differential of the short cycles opposed to the relative variations between the TMI and TMFET rates.

From this initial impact on the intensity of the endogenous cyclical dynamics, resulting from the overcoming of restrictive structural factors, the exogenous forces will remain inert, leaving the variations in the TMI and TMFET rates, depending exclusively on the behavior of the endogenous cyclical dynamics, until new structural factors were overcome.

But, given the inertia of exogenous forces, in the period in which the structural base would remain unchanged, which would then explain the variability of mortality rates and, consequently, the continuity of opposite parallel cycles during this period of validity of a certain static structural base?

The explanation lies in the randomness in which the shared causal factors manifest themselves as lethal, which can cause both fetal and infant death, which, as seen above, changes the relative composition between the occurrence of fetal and infant deaths within the obituary segment due to causes shared. By changing this relative composition, the TMI and TMFET rates will change simultaneously in the opposite direction (fall/increase). Given the “fine line” that separates the two concepts, as it all depends on whether or not the child presents any sign of life, however minimal, after separation from the mother's body, whether or not the child has any sign of life, however minimal, means that the two rates would be subject to systematic and significant inverse variations, even without changing the total number of deaths.

This randomness means that the lethal manifestation of the obituary cause is independent of exogenous interference, characterizing, therefore, an endogenous fact that, together with the excluding interdependence relationship resulting from the interaction between the two events, will support the endogenous cyclical dynamics, continuing to the opposite cyclical variations between the two rates, even in the period in which the conditioning base of restrictive structural factors remains unchanged.

Finally, in the period in which the conditioning structural base prevails, the variability in infant mortality rates will be determined exclusively by endogenous forces, however, within the limits, equally immutable, imposed by the prevailing structural base. It means that endogenous forces, through short-term cyclical dynamics, will be fundamental in determining annual (or short-term) mortality rates, IMR and TMFET.

3.3.2 ON THE DETERMINATION OF CHILD MORTALITY RATES

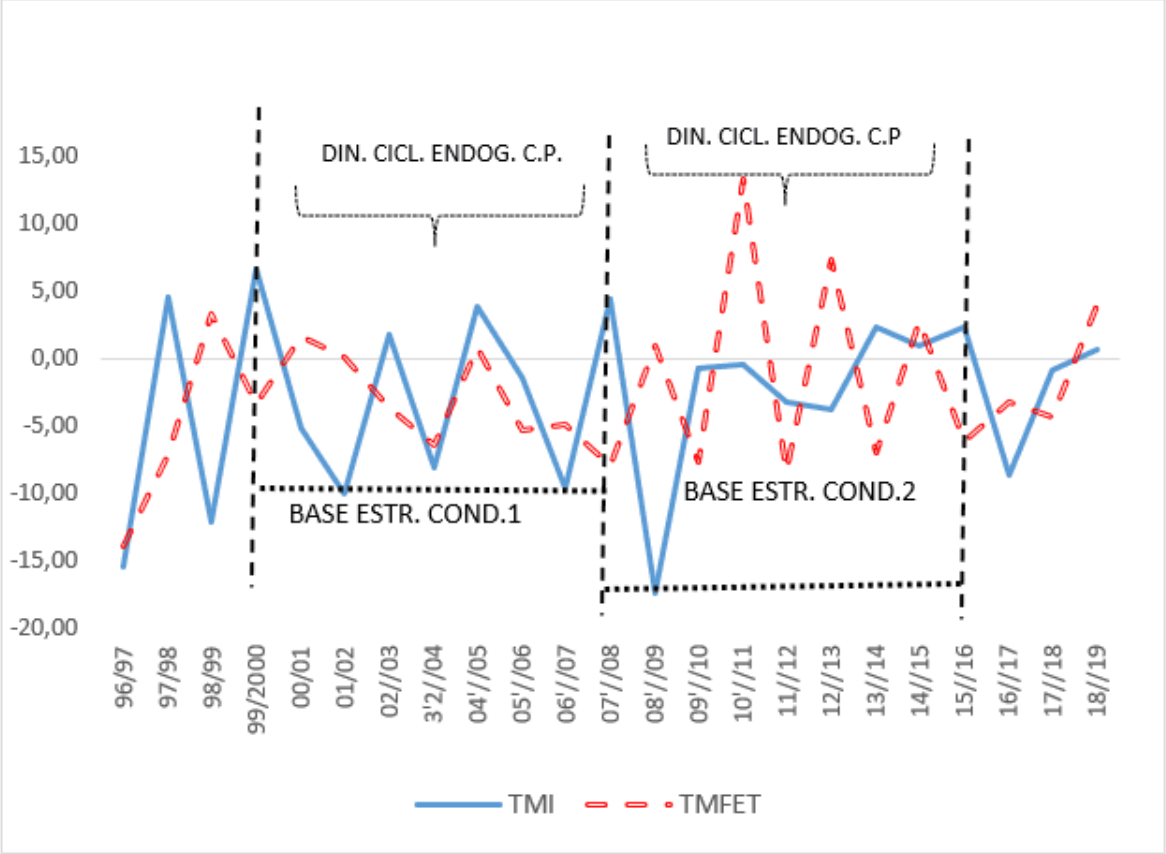
As seen, given the immutability of structural factors in the short term, theoretically, it presupposes that a certain conditioning structural base lasts in the medium term horizon, as well as the restrictions/limitations imposed by it, remain unchanged, configuring, therefore, a base rigidity upon which, then, the endogenous cyclical dynamics of the opposite short-term cycles will manifest itself, implying that in this interval the variability of the annual rates of infant and fetal mortality is solely and exclusively due to the action of endogenous forces that sustain that dynamic. The variability of these rates occurs within limits established by the current conditioning structural base, since endogenous forces would be insufficient to break them.

It means that, during this period in which the conditioning structural basis remains unchanged, the annual (or short-term) rates of infant mortality, IMR, and fetal mortality, TMFET, will be determined by the hybrid action of exogenous and endogenous forces. That is, while static exogenous forces, originating from the presence of restrictive structural factors, impose limits on the variability of the TMI and TMFET mortality rates, in turn, endogenous forces, originating from the relationships established between fetal deaths and infant deaths from obituary causes shared, through short-term cyclical dynamics, are determinants of the variability of these rates, thus resulting from the adjustment between these two forces, the determination of rates.

Therefore, the validity of the assumption regarding the “sovereignty” of structural factors in determining infant mortality rates is called into question, given that the endogenous component will always be present.

Given the importance of the topic, seeking to better clarify the theoretical reflections above, Graph 2 was prepared, which reproduces the projections of short-term cyclical dynamics, from Graph 1 above, on which two supposed periods were randomly demarcated indicating the overcoming of structural factors with alteration in the conditioning structural base.

Graph 2 - Variability infant and fetal mortality rates in the short term.



Source: IVPA variation indices of TMI and TMFET – reproduction Chart 1. Simulations designed by the author.

In the medium term period 1, the endogenous cyclical dynamics manifests itself on an immutable conditioning structural base, configuring, therefore, a rigid scenario, on which the endogenous cyclical dynamics will manifest itself through the opposite cyclical variations between the IMR and TMFET that occur throughout this period, within the limits established by the conditioning structural base then in force.

That is, the intensity in the variations of these rates and, consequently, of the endogenous cyclical dynamics, occurs within the limits imposed by exogenous forces originating from the structural basis of restrictive factors (poverty, sanitation, education, etc.), which will only be broken, particularly regarding the lower limit for these rates to fall, with the overcoming of new restrictive structural factors, marking the beginning of a new medium-term period (Period 2), now governed by a new less restrictive conditioning structural base, in which the endogenous cyclical dynamics of the short-term opposite cycles will manifest to a lesser extent; that is, with relative variations of its components, TMI and TMFET, less accentuated, forming short opposite cycles with smaller “peak/floor” differential and repetitive intermittence of these opposite cycles.

It can be inferred from this that the endogenous forces, which sustain the short-term cyclical dynamics, are not enough to break the conditionalities imposed by structural factors; therefore, incapable of leading, by themselves, to an effective reduction in infant mortality rates, which will only be possible, in the medium term, with the overcoming of restrictive structural factors.

3.3.3 OVERCOMING STRUCTURAL FACTORS AND INTERMEDIATION OF CYCLIC DYNAMICS

Overcoming restrictive structural factors (improvement in basic sanitation conditions, for example), as is to be expected, implies a reduction in fetal deaths and infant deaths from shared causes, “weakening” the endogenous forces, once

originating from the interaction between these two events by changing necessarily passes through the intermediation of cyclical dynamics. Overcoming structural factors also implies a reduction in the IMR and TMFET rates, thus directly altering the two components of the endogenous cyclical dynamics and, consequently, reducing their intensity, reducing the "peak/floor" differential in relation to the opposite short cycles between the two rates.

The final effect on the level of infant mortality, resulting from the overcoming of restrictive structural factors, will depend on how much changes in the TMI and TMFET rates will impact on the intensity of the short-term endogenous cyclical dynamics, since, from there, the variations in both rates will be due to the endogenous dynamics, within the limits established by restrictive factors still present, however, without the influence of exogenous forces related to the structural factors then overcome.

Finally, although insufficient to overcome limits imposed by exogenous forces regarding the minimum level for the fall in infant mortality rates, when this occurs due to the overcoming of restrictive structural factors, the final impact on the new limit level necessarily passes through the intermediation of the dynamics endogenous cyclical process that, ultimately, will be decisive in defining the intensity of the final effect on the level of infant mortality.

The intermediation of the endogenous cyclical dynamics in the transmission of the final effects on the level of infant mortality assumes particular importance from the perspective of public policies, subject of the next section.

3.3.4 PUBLIC POLICY AND INTERMEDIATION OF ENDOGENOUS DYNAMICS

Any public policy aimed at reducing infant mortality levels implies actions seeking to overcome conditionalities imposed by restrictive structural factors. It means that

the impact of such actions will be transmitted through the endogenous cyclical dynamics, which will be decisive in determining the intensity of the effects on the level of mortality resulting from those actions. In turn, this intensity depends on how much the radiating power of endogenous forces will be reduced, altering the intensity of the short-term endogenous cyclical dynamics, which will be emitted altered to be transmitted, will depend on the changes caused in terms of the dimension of the intensity of the impact on the level of mortality.

Reinforcing what has already been said, in fact, everything depends on the reduction in the occurrence of fetal deaths and infant deaths from common causes, thus reducing the power of endogenous factors and, consequently, the intensity of the short-term cyclical dynamics, implying smaller restrictions preventing the fall in infant mortality.

From a practical perspective, what is intended here is mainly to draw attention to the relevance of the segment of deaths from shared causes in the context of public policies, deserving special attention in the definition of actions. It should be clear that the endogenous forces originating in this segment are impediments to greater effectiveness of actions, and may even jeopardize the success of policies.

Therefore, it is a strategic segment, since objectively directed actions to reduce the impetus of endogenous forces will certainly have more effective results in terms of reducing infant mortality levels. In this context, actions aimed at reducing fetal mortality assume particular relevance within the scope of public policies, as it would be like “nipping the disease in the bud”, acting directly at the origin of the factors responsible for most infant deaths, given that all causes obituaries of fetal deaths, are potential factors to lead to infant death, if lethality does not manifest during the gestational period. This fact is of crucial importance from the perspective of public policies, as it means that any reduction in fetal deaths would result in a symptomatic reduction in infant deaths from common obituary causes, since eliminating the possibility of manifestation of lethality from a given cause in the

gestational period, it eliminates, at the same time, the possibility of such manifestation occurring after the birth of the child. In other words, the reduction in infant deaths from common obituary causes would be a “consequence” of the reduction in fetal deaths; in other words, the fall in TMI would be due to the fall in TMFET.

However, a reduction in infant deaths from shared obituary causes would not result in a reduction in fetal deaths; that is, the fall in the TMI would not imply a fall in the TMFET. In fact, what is actually observed is the significant drop in the IMR, without the corresponding drop in the TMFET, as a result of the historical neglect of fetal mortality within the scope of public policies.

In view of this, it is pertinent to expand on the issue a little further, referring to a well-known fact, about the extraordinary drop in infant mortality rates observed in the last two decades in almost all countries/regions of the world, including Brazil. The main reason for this, which is also widely known, would be the spread of modern medicine, with new technology, procedures and knowledge in the field of child health.

It was, in fact, a worldwide movement for the dissemination of modern techniques of child medicine, already available in advanced countries, which had become urgent in the face of the worsening differences in the levels of infant mortality between nations and regions of the world, counting for this with the support of international funding institutions.

It so happens that such techniques were conceived in developed countries in accordance with their respective realities, being primarily aimed at ensuring a healthy life for live newborns, therefore, in total disrespect to the reality of underdeveloped or developing countries. In view of this, the new techniques had to be adapted to the reality of these countries, in order to avoid deaths of live newborns in precarious health conditions. That is, to prevent the lethality of

common obituary causes, when not manifested in the gestational period, from manifesting itself after birth. And in the wake of this movement, local governments were induced to prioritize actions aimed at the survival of children born alive in a precarious state of health; or more objectively, to avoid the death of children from diseases/diseases, whose lethality ceased to manifest during the gestational period, with the risk of manifesting itself, as such, after the child's birth.

However, despite the significant reduction in infant mortality rates, from a theoretical point of view, it would be a wrong strategy, since the fall in the IMR would not imply any change in TMFET, resulting, therefore, in less impact on the endogenous cyclical dynamics of short term; therefore less intense effect on the level of infant mortality. Furthermore, this strategy would not imply an effective improvement in the health conditions of the child population, which would continue to be at risk of the lethal action of the same causal factors. Finally, it is a strategy that does not imply direct action on the origin of endogenous forces, but on the harmful effects of these forces.

For all these reasons, it is possible to say about the lack of common sense of local governments in continuing to neglect the relevance of fetal mortality in the context of public policies, insisting on a less effective strategy and, certainly, involving higher costs.

4. FINAL CONSIDERATIONS

As for the answer to the guiding question for the conduct of this work, about the implications of the interdependence relationship that is naturally established between fetal deaths and infant deaths from shared obituary causes, in the analytical perspective of the phenomenon of infant mortality, in view of the various revealing findings, it remains the slightest doubt about the urgent need to rethink the analysis of infant mortality, breaking with the old tradition, inexplicably, still prevailing, of analyzing infant mortality restricted solely to the deaths of live-born

children who died before reaching 1 year of age the tradition breaks with the tradition of analyzing infant mortality, taking only the IMR as a reference parameter, as if it were sufficiently capable of expressing the entire complexity of the phenomenon. It makes no sense to analyze infant mortality, ignoring the existence and particularities of the obituary segment of shared causes, consisting of fetal deaths and infant deaths from common causes. It makes no sense to analyze infant mortality, neglecting the links between fetal deaths and infant deaths and, consequently, ignoring the power of irradiation of the endogenous forces resulting therefrom on the entire universe of infant mortality.

Finally, the urgency of assuming a broader conception of infant mortality in the context of a comprehensive universe, including fetal mortality, is clear, recognizing the various obituary segments or subgroups and, mainly, the interrelationships that are established between them.

As for the objective outlined to analyze the relationship of interdependence between the two events in the perspective of advancing and deepening knowledge about the complexity of the phenomenon of infant mortality, the work brings to light several elements, revealing aspects still unknown or neglected regarding their relevance, among which stand out:

-, The empirical demonstration of the existence of the endogenous dynamic process intrinsic to the phenomenon of infant mortality itself, which originates and is sustained from endogenous forces that, in turn, emerge naturally from the interaction between fetal deaths and infant deaths from causes shared obituaries, which qualify them as mutually exclusive events, in which the occurrence of one of them, symptomatically excludes the occurrence of the other, establishing an inexorable relationship of excluding interdependence between the two events, supporting the endogenous process of the dynamics cyclical, which manifests itself, in the real plane, through relative variations of the TMI and TMFET rates, forming parallel and opposite cycles of short duration over time.

- In addition to the relevance of this finding in itself, the short-term endogenous cyclical dynamics represents the opening of a range of possibilities to advance in the knowledge of several specific points, revealing the infant mortality phenomenon in all its complexity, as in some reported conclusions below.

- That infant mortality rates are determined through the hybrid action of exogenous forces, emanating from restrictive structural factors, and endogenous forces, originating from the exclusive interdependence relationship between fetal deaths and infant deaths from shared obituary causes, transmitted through the cyclical dynamics of short term, putting into “check” the then prevailing assumption regarding the supremacy of structural factors as sovereign and unique determinants in the determination of these rates.

- That any and all changes in infant mortality rates, resulting from the overcoming of restrictive structural factors (reduction of poverty, improvement in basic sanitation, etc.) necessarily passes through the intermediation of the endogenous cyclical dynamics, acting as a last resort definer of the intensity of the effects on the health conditions of the child population as a whole.

- On the importance of short-term endogenous cyclical dynamics in the context of public policies as a defining instance of the intensity on the level of infant mortality resulting from such policies, which opens up a range of options to reflect on action strategies in the search for greater effectiveness results, for example, on the emphasis on reducing fetal deaths, mentioned in the work.

In view of the findings/conclusions and the lack of specific studies on the subject discussed here, it is certain that this work has much to contribute to deepening the knowledge of the phenomenon of infant mortality, bringing to light several elements still unknown, revealing secrets of the complexity that involves the phenomenon of infant mortality, as well as drawing attention to several relevant aspects still neglected by many of those who militate in the field of child health.

On this last aspect, the work has the merit of calling attention to the relevance of infant deaths from obituary causes common to fetal deaths in the analytical perspective of the phenomenon, hitherto unknown and neglected, although its expressiveness in numerical terms is widely known. The same is valid for the segment of deaths from common causes as the “locus” of the interaction of occurrences between fetal deaths and infant deaths, from which endogenous forces emerge, supporting an endogenous cyclical dynamic, intrinsic to the phenomenon of infant mortality.

In these terms, the work as a whole can be seen as the development of the thesis on the relevance of infant deaths resulting from obituary causes common to fetal deaths, as it is at the origin of endogenous forces that emerge, inexorably from the interaction between these deaths infant and fetal deaths, supporting an endogenous cyclical dynamic, radiating its effects throughout the universe of infant mortality, permanently altering this scenario.

REFERENCES

BARBEIRO, Fernanda Moreira dos Santos; FONSECA, Sandra Costa; TALFERLLI, Mariana Girão; *et al.* ,– Óbitos Fetais no Brasil- Revisão sistemática; *in Revista de Saúde Pública*/RJ -2015;49:62 - DOI:10.1590/S0034-8910.2015049005568 Artigo disponível em português e inglês em: www.scielo.br/rsp - ACESSO 13/04/2020.

BRASIL, Ministério da Saúde - Secretaria de Vigilância em Saúde – Mortalidade Infantil no Brasil; *in* Boletim Epidemiológico; nº 37. Vol. 53.; p. 1 a 15; Brasília; DF; out 2021. Disponível em: www.saude.gov.br/svs; ACESSO em 15/11/2021.

BRASIL, Ministério da Saúde - DATASUS Informações de Saúde; Estatísticas Vitais. Sistema de Informações de Nascidos (SINASC) e Sistema de Informações

de mortalidade (SIM); Disponível em: http://tabnet.datasus.gov.br ACESSO: várias datas - coleta de dados.

BRASIL; Ministério da Saúde - Manual de Vigilância do Óbito Infantil e Fetal e do Comitê de Prevenção do Óbito Infantil e Fetal - Normas e Manuais Técnicos - Série A. 2ª ed; - Brasília – DF 2009 - Biblioteca Virtual em Saúde do Ministério da Saúde: http://www.saude.gov.br – ACESSO 20/08/2020.

FLORÊNCIO, Valéria.; SOUZA, Wanessa; LIMA. Alessandra; VELASCO. Wisley - Fatores associados a mortalidade infantil -Subsecretaria de Saúde Gerência de Informações Estratégicas em Saúde– Brasília, DF- 2021 site: : http://www.saude.gov.br/CONECTA-SUS. ACESSO 05/12/2021.

Sent: March, 2021.

Approved: June, 2022.