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Analysis of births and deliveries in Poland in the years 2009–2019 based on reporting data from various sources*

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ABSTRACT
There are at least 3 different sources of data on births and/or deliveries in Poland, namely the National Health Fund, the Department of Screening Tests and Metabolic Diagnostics at the Institute of Mother and Child, and Statistics Poland (formerly the Central Statistical Office). Even though they contain complementary data, it is not possible to obtain comprehensive statistics based on any of the sources alone, while combining them is not obvious. Although this is possible for the first 2 sources – and only to a limited extent (as individual data are reported according to the mother's identifiers), the statistical data from Statistics Poland are available in aggregated form only. Moreover, even after combining the data from the National Health Fund and the Department of Screening Tests and Metabolic Diagnostics at the Institute of Mother and Child and, hence, the acquisition of more comprehensive information on mothers and their newborns, these newborns are still not uniquely identifiable as they lack personal identification numbers, e.g., the Polish national identification number (PESEL). As a result, the statistics prepared for this paper are based on the estimated number of delivered newborns. Also, the data are not without certain flaws and errors because they are reported ambiguously, while labour and delivery data are not available for every single birth.
Keywords: statistics; births; labour and delivery; perinatal reporting.

INTRODUCTION

Currently, there is not a single reliable source of data containing basic characteristics and comprehensive statistics on childbirth in Poland. Despite a new organisational standard on perinatal care coming into effect from 1 January 2019, the data reporting methodology has remained unchanged [1]. Therefore, to obtain information on the number of hospital deliveries as part of the health services financed by the National Health Fund (NFZ) in respective years, one should refer directly to the data originating from the NFZ. On the other hand, the database of the Department of Screening Tests and Metabolic Diagnostics at the Institute of Mother and Child (ZBPiDM-IMiD) contains more detailed information on births. As a rule, the Newborn Screening Programme covers the entire population of Poland. There is also a public statistical database on births kept by Statistics Poland (GUS). However, each of these sources has its disadvantages and limitations. This paper attempts to compare the data originating from all 3 sources.

DATA ON DELIVERIES AVAILABLE FROM THE NATIONAL HEALTH FUND

The data from the NFZ for the period 2009–2019 cover hospitalisations classified according to Diagnosis-Related Groups (DRG) with labour-related health service codes i.e.:

- N01 Childbirth,
- N02 Multiple birth and preterm birth,
- N03 Gestational and foetal pathology with delivery >5 days,
- N09 Severe gestational pathology with delivery – extended diagnostics, comprehensive treatment >10 days,
- N11 Severe gestational pathology with delivery – extended diagnostics, comprehensive treatment >10 days with complications and comorbidities,
- N13 Severe gestational pathology with instrumental birth >3 days.

Every hospitalisation with a reported delivery can be additionally characterised by a unique female patient identifier, registered place (poviat) of residence, date of admission, date of discharge, type of admission, type of discharge, hospital ID and location (poviat), hospital ward (organisational unit code), main diagnosis ICD-10, health service code/codes (reportable health services), code/codes of contracted service range or completed ICD-9 procedures. Table 1 shows the basic data on the unique number of patients and unique number of hospitalisations during which any of the 6 above-mentioned DRG was reported in respective years as part of an in-patient stay. Please note that the years listed in the table are not the years of childbirth, but the years in which the mothers were discharged from hospital (for instance, a patient admitted on 31 December 2015 and discharged on 4 January 2016 is assigned to the 2016 patient group).

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TABLE 1. Number of patients and hospital admissions assigned to Diagnosis-Related Groups labour and delivery codes in the years 2009–2019 according to the National Health Fund data

Year	Number of female patients (in thousands)	Number of hospitalisations (in thousands)
2009	407.3	407.5
2010	402.7	402.8
2011	379.8	379.9
2012	380.4	380.5
2013	360.3	360.5
2014	365.2	365.3
2015	363.5	364.2
2016	367.2	367.6
2017	367.1	367.2
2018	341.9	341.9
2019	324.1	324.1

Source: Authors' own elaboration based on NFZ data.

As mentioned in the introduction, there is not a single reliable source of data on the number of deliveries in Poland. Each of the sources cited in this paper has its own advantages and limitations. The advantages and limitations of NFZ data are presented below.

Advantages of NFZ data:

- large number of variables for every childbirth-related hospital stay, e.g.: date of admission and discharge from hospital, type of admission and discharge, hospital ID and location (poviat), hospital ward (organisational unit code), primary diagnosis ICD-10, health service code/codes (reportable health services), code/codes of contracted service range and completed ICD-9 procedures (e.g., caesarean section or episiotomy),
- variables containing demographic data on patients, e.g.: date of birth, registered place (poviat) of residence.

Limitations of NFZ data:

- reporting data – reporting what was most profitable from the hospital's financial point of view, not necessarily consistent with the facts,
- lack of a clear date of delivery,
- no information on the actual number of delivered newborns,
- no information on live births or foetal deaths (stillbirth),
- reporting data referring to mothers only, lack of basic data on newborns (e.g., sex, birth weight, Apgar score, and week of delivery),
- only public hospital births are included in reporting data (i.e., health services contracted by NFZ); home births, births in private hospitals, or children delivered outside Poland are not included.

DATA ON BIRTHS AVAILABLE FROM THE DEPARTMENT OF SCREENING TESTS AND METABOLIC DIAGNOSTICS AT THE INSTITUTE OF MOTHER AND CHILD

The ZBPiDM-IMiD is an independent source of childbirth data containing detailed information on every single neonate. Launched in 1994, the Newborn Screening Programme is a free-of-charge project covering the entire population of Polish neonates, with a constantly growing range of detected congenital diseases [2]. Within the first 48 h of life, a blood sample is taken from the newborn's heel, blotted onto a special blood spot card, and recorded under the mother's ID [3]. As a result, the database of the ZBPiDM-IMiD contains additional information including the mother's unique ID, the exact time and date of birth, sex of the newborn, order of birth in case of multiple deliveries (e.g. in case of twins: S1, D2 – first born son, second born daughter), birth weight, Apgar score, week of delivery, and ID of the hospital where the delivery took place. Given that it is impossible to identify newborns uniquely, identifiers were assigned to newborns in the data to estimate their number. It was assumed that a newborn is uniquely identified if he/she has the following unique column values: mother's ID, date of birth, time of birth, and newborn's sex.

Table 2 shows the basic data on the unique number of patients and newborns in the period under consideration. The year is based on the exact date of birth.

TABLE 2. Number of patients and newborns in the years 2005–2019 according to the original data obtained from the Department of Screening Tests and Metabolic Diagnostics at the Institute of Mother and Child

Year	Number of female patients (in thousands)	Number of newborns (in thousands)
2005	360.2	365.3
2006	369.8	374.9
2007	383.8	389.2
2008	407.3	413.0
2009	411.8	417.9
2010	406.5	412.4
2011	382.6	388.0
2012	383.2	388.5
2013	363.8	368.9
2014	368.9	373.9
2015	365.4	370.3
2016	373.6	378.9
2017	396.9	402.6
2018	381.7	386.9
2019	368.2	373.3

Source: Authors' own elaboration based on ZBPiDM-IMiD data.

Advantages of ZBPiDM-IMiD data:
- exact time and date of birth of neonates,
- availability of basic newborn data (e.g., sex, birth weight, Apgar score, and week of delivery),
- availability of data on babies born in public hospitals (with NFZ contracts), private hospitals, and at home (the entire population has been covered by law since May 1994).

Limitations of ZBPiDM-IMiD data:
- lack of unique personal identification numbers of newborns,
- in case of hospitalised patients, there are no specific hospitalisation variables i.e., the date of admission and discharge, type of admission and discharge, hospital ward (organisational unit code), primary diagnosis according to ICD-10, health service code/codes (reportable health services), code/codes of contracted service range and completed ICD-9 procedures,
- lack of information on the type of delivery,
- lack of variables containing demographic data on mothers, e.g.: date of birth, registered place (poviat) of residence.

DATA ON BIRTHS AVAILABLE FROM STATISTICS POLAND

Statistics Poland publishes annual Demographic Yearbooks containing data on live births (according to GUS, a live birth is "the complete expulsion or extraction from its mother of a newborn, irrespective of the pregnancy duration, that after such expulsion or extraction breathes or shows any other signs of life, such as a heartbeat, pulsation of the umbilical cord or muscle contractions depending on the will, whether or not the umbilical cord has been cut or the placenta has been separated") and stillbirths (according to GUS, a stillbirth – foetal death – is "the complete expulsion or extraction from its mother of a foetus, if the pregnancy duration reached 22 weeks, that after such expulsion or extraction does not breathe or show any other signs of life, such as a heartbeat, pulsation of the umbilical cord or muscle contractions depending on the will") [4]. The data for 1990–2019 have been collected and presented in Table 3.

Advantages of GUS data:
- overall number of births and classification into live births and stillbirths,
- overall number of births and those classified as multiple deliveries,
- availability of aggregated data on live births by different criteria, e.g.: by sex, birth weight, gestational age, marital status of the mother, place of residence of the mother, voivodeship (province) and town/city, order of birth, parent age group, time intervals between births, and education of parents,
- availability of separate data on the number of babies delivered in Poland by foreign nationals (women with the 'temporary visitor' status, with a permanent place of residence outside Poland).

TABLE 3. Number of live births and stillbirths in the years 1990–2019 according to Statistics Poland data

Year	Number of births (in thousands)		
	total	live	still
1990	551.7	547.7	3.9
1991	551.5	547.7	3.7
1992	518.7	515.2	3.5
1993	497.7	494.3	3.4
1994	485.1	481.3	3.8
1995	436.3	433.1	3.2
1996	431.2	428.2	3.0
1997	415.2	412.6	2.5
1998	398.1	395.6	2.5
1999	384.4	382.0	2.4
2000	380.5	378.3	2.1
2001	370.2	368.2	2.0
2002	355.5	353.8	1.8
2003	352.8	351.1	1.7
2004	357.9	356.1	1.8
2005	366.1	364.4	1.7
2006	376.0	374.2	1.8
2007	389.7	387.9	1.8
2008	416.4	414.5	1.9
2009	419.3	417.6	1.7
2010	415.0	413.3	1.7
2011	390.1	388.4	1.7
2012	387.9	386.3	1.6
2013	371.0	369.6	1.4
2014	376.5	375.2	1.3
2015	370.4	369.3	1.1
2016	383.4	382.3	1.1
2017	403.1	402.0	1.1
2018	389.5	388.2	1.3
2019	376.2	375.0	1.2

Source: Authors' own elaboration based on GUS data from Demographic Yearbooks.

Limitations of GUS data:
- lack of statistics on the type of delivery,
- lack of data on babies delivered by foreign nationals (women with the 'temporary visitor' status, with a permanent place of residence outside Poland) in the statistics on the total number of births in Poland [5].

COMPARISON OF DATA FROM DIFFERENT SOURCES

As mentioned in the foregoing sections of this paper, there are at least 3 sources of birth and labour/delivery data in Poland. However, due to limited reporting, the data originating from the NFZ concerning the number of female patients and hospitalisations with childbirthrelated codes, according to DRG, are only available for the years 2009–2019. The Department of Screening Tests and Metabolic Diagnostics at the Institute of Mother and Child data on the estimated number of newborns and female patients who delivered a baby can be applied to the years 2005–2019 because the data for the years before 2005 are incomplete. On the other hand, GUS data on the number of live births and stillbirths cover the longest period (spanning 1990–2019).

For the period between 2005–2019, an average of 99.5% of the data on the total number of births (i.e., the number of newborns), according to ZBPiDM-IMiD, correspond to the data of GUS in terms of numerical values (a min. of 98.82% in 2016 and a max. of 99.98% in 2015). This convergence is clearly visible when comparing Table 2 (column "Number of newborns") and Table 3.

On the other hand, for the years 2009–2019, an attempt can be made to compare the data on the number of female patients according to NFZ and ZBPiDM-IMiD data, bearing in mind the limitation that the NFZ data only cover hospitalisations described with the following DRG codes: N01, N02, N03, N09, N11, and N13. The overlap percentage between the data from the 2 sources is approx. 96.6% (lowest in 2019 – 88.01% and highest in 2015 – 99.48%).

As stated above, each of the analysed sources has its own limitations. Therefore, it was decided to combine the data from ZBPiDM-IMiD and NFZ using the most effective methods to obtain the most comprehensive information on births and delivery/labour in Poland.

METHODOLOGY OF COMBINING THE DATA FROM THE DEPARTMENT OF SCREENING TESTS AND METABOLIC DIAGNOSTICS AT THE INSTITUTE OF MOTHER AND CHILD AND THE NATIONAL HEALTH FUND FOR THE YEARS 2009–2019

The data from the ZBPiDM-IMiD were first subjected to simple transformations e.g., changes of data format for dates (for the 'date_of_birth' variable) or numbers (for 'birth_weight, week_of_delivery' and 'Apgar_score' variables). Subsequently, 3 new variables were created, namely: 'year_of_birth', 'month_of_birth' and 'day_of_birth', which, based on the 'date_of_birth' variable, indicate the year, month, and day of birth of a newborn respectively. During the next step, the hospital information on mothers identified in ZBPiDM-IMiD data were retrieved from the database of the NFZ for the years 2009–2019. However, the search was limited to hospitalisations containing any of the following DRG codes: N01, N02, N03, N09, N11, or N13. The resulting 2 datasets were then combined according to patient identifiers and an assumption was made that during a hospitalisation (the beginning of which is defined by the 'date_of_admission' variable and the end by the 'date_of_discharge' variable), a childbirth (defined by the 'date_of_birth' variable) had to take place, i.e.:

$$\underbrace{\text{date\_of\_birth}}_{\text{ZBPiDM-IMiD data variable}} \in \underbrace{\langle \text{date\_of\_admission};\ \text{date\_of\_discharge} \rangle}_{\text{NFZ data variables}}$$

Table 4 shows statistical data on the overlapping of unique mother identifiers for the assumption defined above. In each of the 11 years covered by the analysis (2009–2019), over 85% of female patients included in the ZBPiDM-IMiD data also appeared in the NFZ data: the most in 2012 (96.78%) and the least in 2019 (85.85%).

TABLE 4. Statistics on the convergence of data available from the Department of Screening Tests and Metabolic Diagnostics at the Institute of Mother and Child and from the National Health Fund in the years 2009–2019

Year	Number of patients from ZBPiDM-IMiD data which were found in NFZ data (in thousands)	Percentage of patients from ZBPiDM-IMiD data which were found in NFZ data	Number of newborns from ZBPiDM-IMiD data remaining in the data after combination with NFZ data (in thousands)	Percentage of newborns from ZBPiDM-IMiD data remaining in the data after combination with NFZ data
2009	394.1	95.70%	399.4	95.56%
2010	390.6	96.11%	396.0	96.01%
2011	369.2	96.49%	374.1	96.43%
2012	370.9	96.78%	375.8	96.73%
2013	351.0	96.48%	355.8	96.45%
2014	356.0	96.49%	360.6	96.46%
2015	352.8	96.55%	357.4	96.50%
2016	354.1	94.79%	359.1	94.77%
2017	359.4	90.54%	364.4	90.51%
2018	334.8	87.71%	339.2	87.67%
2019	316.1	85.85%	320.3	85.81%

Source: Authors' own elaboration based on ZBPiDM-IMiD and NFZ data.

DATA ERRORS

After combining data for the years 2009–2019, several errors in certain birth data variables were identified. These included:

1) female patients coded as males: "male" was entered in the sex section for 2 patients;

2) no sex indicated for some newborns or indicated in an inconsistent manner: sex was not identified for 0.08% of the newborns (approx. 3.0 thousand);

3) Apgar score outside the 0–10 range: the Apgar score should be between 0–10. However, this was not the case for a total of 0.1% of the newborns (4.2 thousand). Five of the most frequently reported incorrect values were: 11, 40, 39, 38, and 41. Presumably, these errors mostly resulted from entering the values in the wrong fields. Values around 38 most likely relate to the gestational age;

4) gestational age outside the 22–44 week range: the assumed viability thresholds for neonates are: at least 500 g birth weight and min. 22-week gestational age [6]. Although there is no upper gestational age limit, a pregnancy over 42 weeks is considered a post-term (prolonged) pregnancy. In this case, the patient should be admitted to hospital. According to the data, the reported foetal age was under 22 weeks or over 44 weeks for about 3.03% of newborns (121.3 thousand cases). Five of the most commonly reported values were: 0, 4, 9, 3, and 10, which probably relate to the Apgar score;

5) birth weight outside the 400–7,000 g range: although the assumed viability thresholds for a newborn are 500 g birth weight and a 22-week gestational age, when the latter condition is met, the former is not always restrictive. For instance, the data includes cases of 400 g newborns delivered in the 24th week of pregnancy. It was therefore considered that birth weights outside the range of 400–7,000 g constitute reporting errors. This concerns 0.04% of the newborns (1.7 thousand cases);

6) in some cases, the date of childbirth is different than the date of the reported obstetric procedure: for instance, some caesarean section procedures were reported a few days earlier or later than the reported date of birth of the newborn. However, information on the exact dates of medical procedures has only been available in the NFZ database since 2015. Therefore, it is impossible to estimate the total number of patients affected by this inconsistency. Based on the 5 years (2015–2019) for which this information is available, this problem affects on average about 12.5% of patients (43.1 thousand cases) per year.

BASIC STATISTICS

The combined data were tabulated to present statistical information on the mothers and newborns from single and multiple pregnancies in the respective years covered by the study (Tab. 5). A multiple pregnancy was reported in cases of delivering at least 2 newborns on the same day or up to 60 days apart (delayed labour) [7]. The remaining gestations were considered single pregnancies.

DISCUSSION

There are still no reliable birth and labour/delivery data in Poland. For such information to be reliable, it must be comprehensive and concern both the mother and the newborn. Even though the information originating from the 3 sources described in this study is complementary, it is also independent as it derives from the reporting of 3 different institutions. The study attempted to combine the data from the ZBPiDM-IMiD and the NFZ as both datasets contain the same mother identifiers. The result is satisfactory: over 85% of female patients appearing in the ZBPiDM-IMiD database could also be found in the data available from NFZ for each of the 11 years covered by the study (2009–2019). With this combination and in addition to the information on childbirth-related hospital stays, the authors obtained additional data on newborns.

On the other hand, the biggest limitation of this combined dataset (as well as of the raw ZBPiDM-IMiD data) is that newborns were not identified by unique ID numbers. As described in the paper, an attempt was made to assign identifiers to newborns based on the assumption that a unique identifier is assigned if it contains the following unique set of 4 values: mother's ID, date of birth, time of birth, and newborn's sex. This solution was adopted for the purpose of estimating the number of newborns. However, it is not without flaws. For example, if 1 woman is assigned 2 different records with identical information on newborns (the same date and time of birth, sex, Apgar score, gestational age, birth weight), there is no certainty that 1 newborn was born that, for some reason, was included twice (because, for example, 2 different blood spot cards were recorded for him/her) or, perhaps, twins with identical parameters were born. As newborns are not clearly identifiable, their later medical history cannot be monitored, i.e., traced to various healthcare providers contracted by the NFZ. To ensure such traceability, a newborn would have to be identified by a Polish national identification number (PESEL).

To obtain fully valuable data, a dictionary of mother and baby identifiers (parental linkage dictionary) would have to be prepared, preferably containing PESELs, which are unique for every individual person. The data on hospital stays of mothers would then originate from the NFZ, while the data from the ZBPiDM-IMiD would contain information on newborns, as is currently the case. As a necessary condition, instead of or in addition to the identification number of every mother, the reporting data would also include a newborn identification number (also preferably the PESEL; a newborn is assigned a PESEL number once he/she has been registered by the parents at the Registry Office – USC – within 21 days of birth) [8]. The data from the 2 institutions would then be combined with the help of the parental linkage dictionary. The identification of patients by PESEL numbers would also allow the medical history of mothers receiving public health services before and after childbirth and of their newborns to be traced.

Another relevant aspect is the quality of reporting data. The paper describes errors identified during the analysis of the available data. Many of the reported values are outside the

TABLE 5. Basic childbirth statistics for single and multiple pregnancies in the years 2009–2019

Statistics	Pregnancy type	Year										
		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Number of patients (in thousands)	single	388.8	385.4	364.4	366.0	346.3	351.3	348.2	349.2	354.5	330.5	312.0
	multiple	5.2	5.2	4.8	4.9	4.7	4.6	4.6	4.9	4.9	4.3	4.1
Number of neonates (in thousands)	single	388.9	385.5	364.5	366.0	346.4	351.4	348.3	349.3	354.6	330.6	312.1
	multiple	10.4	10.5	9.6	9.8	9.4	9.3	9.1	9.7	9.8	8.6	8.2
Average birth weight (in grams)	single	3,388	3,393	3,391	3,390	3,382	3,383	3,384	3,386	3,394	3,393	3,395
	multiple	2,458	2,446	2,423	2,413	2,390	2,359	2,370	2,367	2,355	2,376	2,366
Mean Apgar score	single	9.3	9.4	9.4	9.4	9.4	9.4	9.0	9.6	9.7	9.7	9.7
	multiple	8.4	8.5	8.5	8.5	8.6	8.5	8.2	8.7	8.9	9.0	9.0
Mean gestational age (in weeks)	single	37.1	37.3	37.3	37.2	37.5	37.7	37.9	38.4	38.8	38.9	38.9
	multiple	34.3	34.5	34.3	34.4	34.3	34.3	34.6	34.9	35.2	35.3	35.3
Mean maternal age	single	27.9	28.2	28.4	28.5	28.7	28.9	29.1	29.3	29.5	29.7	29.9
	multiple	29.2	29.4	29.6	29.8	30.0	30.3	30.4	30.5	30.6	30.7	30.9
Average length of stay in hospital (in days)	single	5.2	5.1	5.1	5.1	5.2	5.3	5.2	5.1	5.0	5.0	5.0
	multiple	12.0	12.0	12.2	12.9	13.5	13.5	13.1	13.4	13.2	12.8	12.9
Predominant Diagnosis Related Group code	single	N01	N01	N01	N01	N01	N01	N01	N01	N01	N01	N01
	multiple	N02	N02	N02	N02	N03	N09	N09	N09	N09	N09	N09
Predominant ICD-10 code	single	O80.0	O80.0	O80.0	O80.0	O80.0	O80.0	O80.0	O80.0	O80.0	O80.0	O80.0
	multiple	O30.0	O30.0	O30.0	O30.0	O60	O60	O30.0	O60	O60	O30.0	O30.0
Percent of C-sections[a]	single	31.0	33.0	35.0	37.0	39.0	42.0	43.0	42.0	42.0	43.0	43.0
	multiple	82.0	84.0	86.0	88.0	92.0	93.0	92.0	91.0	91.0	90.0	89.0
Percent of natural deliveries[b]	single	66.0	64.0	63.0	61.0	59.0	56.0	55.0	54.0	54.0	53.0	53.0
	multiple	17.0	16.0	14.0	12.0	8.2	6.7	7.5	7.5	7.2	8.3	7.1
Percent of forcep deliveries[c]	single	0.4	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.3	0.3	0.3
	multiple	0.2	0.2	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.1
Percent of vacuum extraction deliveries[d]	single	0.8	0.9	0.9	1.0	1.0	1.0	1.0	1.1	1.0	1.1	1.3
	multiple	0.2	0.4	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.2
Percent of deliveries with obstetrical procedures[e]	single	3.9	3.7	4.0	3.7	3.5	3.9	4.2	4.1	4.1	4.2	4.9
	multiple	1.7	1.4	1.7	1.0	0.7	0.6	0.9	1.2	1.2	1.2	2.0
Percent of episiotomies[f]	single	47.0	45.0	43.0	40.0	38.0	35.0	33.0	32.0	30.0	29.0	27.0
	multiple	13.0	11.0	9.5	7.3	5.2	3.9	4.1	4.6	4.1	4.4	3.6

[a] Cesarean section was defined as the occurrence of any of the following procedures according to the ICD-9 classification: 74, 74.0, 74.1, 74.2, 74.4, 74.41, 74.42, 74.9, 74.991.
[b] Spontaneous vaginal delivery was defined as the occurrence of the following procedures according to the ICD-9 classification: 73.7, 73.71, 73.72, 73.73.
[c] Forcep delivery was defined as the occurrence of any of the following procedures according to the ICD-9 classification: 72.0, 72.1, 72.2, 72.21, 72.29, 72.31, 72.53, 72.6, 73.3, 73.31, 73.32.
[d] Vacuum extraction delivery was defined as the occurrence of any of the following procedures according to the ICD-9 classification: 72.7, 72.71, 72.79.
[e] Obstetrical procedures assisting delivery were defined as the occurrence of any of the following procedures according to the ICD-9 classification: 72.5, 72.52, 72.54, 72.8, 72.9, 73, 73.0, 73.01, 73.011, 73.09, 73.091, 73.099, 73.1, 73.11, 73.211, 73.4, 73.5, 73.51, 73.59, 73.591, 73.592, 73.8, 73.9, 73.91, 73.92, 74.3, 74.31, 74.32.
[f] Episiotomy was defined as the occurrence of any of the following procedures according to the ICD-9 classification: 72.1, 72.21, 72.31, 72.71, 73.6, 73.61, 73.62, 73.72.
Source: Authors' own elaboration based on NFZ and ZBPiDM-IMiD data.

possible thresholds, which is most likely due to entering data in the wrong fields. Applying a set of rules for each field/box to be filled by the reporting person (e.g., selecting values from a drop-down list) would help rule out the risk of possible errors.

In addition to the information currently included in the reporting data, to avoid any speculation and ambiguities, uniform reporting standards would have to be introduced, i.e., every delivery should contain information on the type of pregnancy (single/multiple), number of live newborns, existing indications for caesarean section (obstetric/nonobstetric, if any), maternal medical conditions (if any), number of previous pregnancies, previous deliveries and miscarriages of the mother (if any), and HIV/HCV-positive mothers.

Given that there is no single central reporting register for births and labours/deliveries, the range of the data currently reported by various institutions is subject to frequent modifications. The acquisition of the same data range was impossible due to the dynamic situation in the last 2 years. The data range is becoming increasingly scarce. What is more, the situation is expected to get even worse due to the COVID-19 pandemic with a decreasing number of deliveries and worse reporting quality.

CONCLUSIONS

1. The data originating from NFZ and ZBPiDM-IMiD are not free from flaws and factual errors.
2. The range of data on births and labours/deliveries currently reported by various institutions is becoming increasingly scarce, which makes it impossible to prepare uniform annual statistics.
3. The introduction of uniform reporting standards (clear identification of the mother and newborn with PESELs with the possibility of combining data using a parental linkage dictionary) with a clear indication of the data to be entered in each field (e.g., drop-down prompts preventing the entry of incorrect values) will help avoid the factual errors mentioned in the paper.
4. The uniform reporting standards should require a clear identification of pregnancy type (single/multiple), the number of live births, existing indications for caesarean section (obstetric/non-obstetric, if any), maternal medical conditions (if any), number of previous pregnancies, deliveries and miscarriages of the mother (if any), and HIV/HCV-positive mothers [9].
5. Although the WHO guidelines do not define the optimal percentage figures for caesarean sections, Poland has one of the highest numbers of Csections compared to Organisation for Economic Cooperation and Development countries and European Union member states [10]. This begs the question: Have all caesarean sections performed so far been justified from a medical point of view?

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