

Estimating Infant Date of Birth in Administrative Claims Databases: A Comparison of Exact Date of Birth and Date of Birth Proxies

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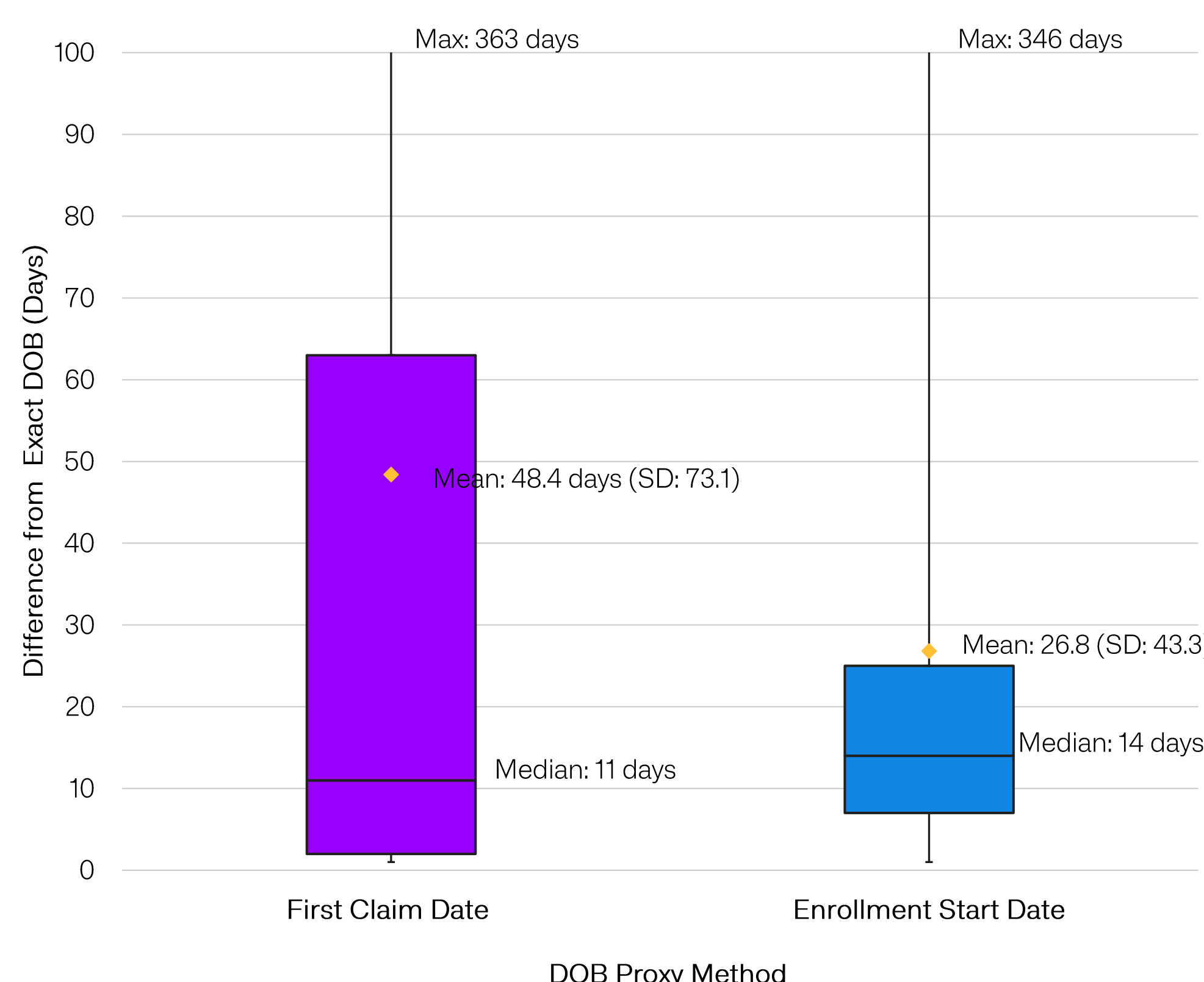


Study Summary

Study Question: How does exact date of birth differ from date of birth estimated using date of birth proxies?

Study Population: Infants with a date of birth between 1/1/2020 and 12/31/2022 and enrollment during the calendar year of birth in the MarketScan Commercial Database

Study Results



Conclusion: DOB proxies often incorrectly estimate DOB in infants. Though claim date proxies performed better than enrollment date proxies, these also failed to correctly assign DOB in many infants.

Methods

- This study used data from the Merative™ MarketScan® Commercial Database spanning 1/1/2020-12/31/2022. Exact DOB (DDMMYYYY) is available in the MarketScan Research Databases for studies conducted by Merative researchers.
- Infants with DOB between 1/1/2020 and 12/31/2022 were identified and required to have enrollment during the calendar year of birth.
- Two date of birth proxies were assigned using calendar year of birth:
 - Date of infant's first medical or pharmacy claim
 - Health plan enrollment start date
- Agreement between exact DOB and each proxy was characterized and the days between each proxy and exact DOB was calculated.
- Proportion of infants with an inpatient claim on their DOB/proxy was also described.

Table 1. Demographic Characteristics of the Study Population (N=605,742)

	N/Mean	%/SD
Proxy Type (N, %)		
First Claim Date	577,915	95.4%
Enrollment Start Date	585,905	96.7%
Claim Date and Enrollment Start Date	559,171	92.3%
Sex (N, %)		
Male	310,246	51.2%
Female	295,496	48.8%
Geographic region (N, %)		
Northeast	97,485	16.1%
North Central	128,026	21.1%
South	259,291	42.8%
West	116,313	19.2%
Unknown	4,627	0.8%
Population density (N, %)		
Urban	548,675	90.6%
Rural	52,968	8.7%
Unknown	4,099	0.7%
Insurance plan type (N, %)		
Comprehensive/indemnity	10,301	1.7%
EPO/PPO	278,092	45.9%
POS/POS with capitation	79,623	13.1%
HMO	70,639	11.7%
CDHP/HDHP	153,556	25.4%
Other/Unknown	13,531	2.2%
Duration of follow-up (Mean, SD)		
Median	472	

CDHP: Consumer Driven Health Plan; EPO: Exclusive Provider Organization; HDHP: High Deductible Health Plan; HMO: Health Management Organization; PPO: Preferred Provider Organization; SD: Standard Deviation

Results

- 605,742 infants with enrollment during their birth year were included in the study. Most could be assigned a DOB proxy using claim date (95.4%) or enrollment date (96.7%) (Table 1).
- Almost 30% (28.4%) were assigned an incorrect DOB using claim date; nearly all (97.3%) were assigned an incorrect DOB using enrollment date. (Figure 1)
- For infants with incorrectly assigned DOB, the mean days between the exact DOB and proxy was 48.4 (SD: 73.1) using claim date and 26.8 (SD: 43.6) using enrollment date. Median days between was 11 days for claim date and 14 days for enrollment date. (Summary Figure)
- 63% of infants had an inpatient claim on the date of the first claim; 4.8% of infants had an inpatient claim on the date enrollment began. (Figure 2)

Figure 1. Agreement Between DOB and Proxies

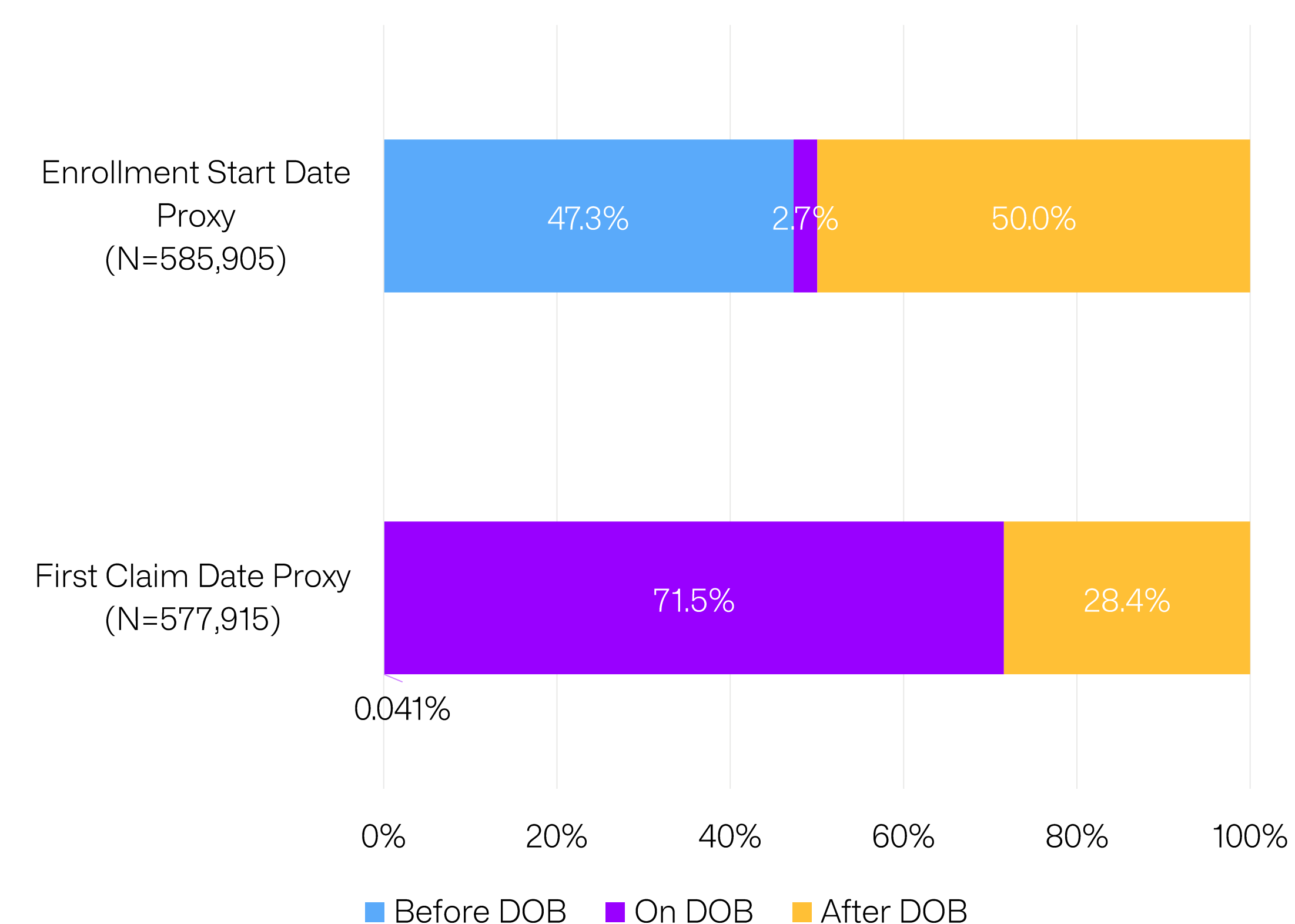


Figure 2. Percent of Infants with an Inpatient Claim on DOB/Proxy

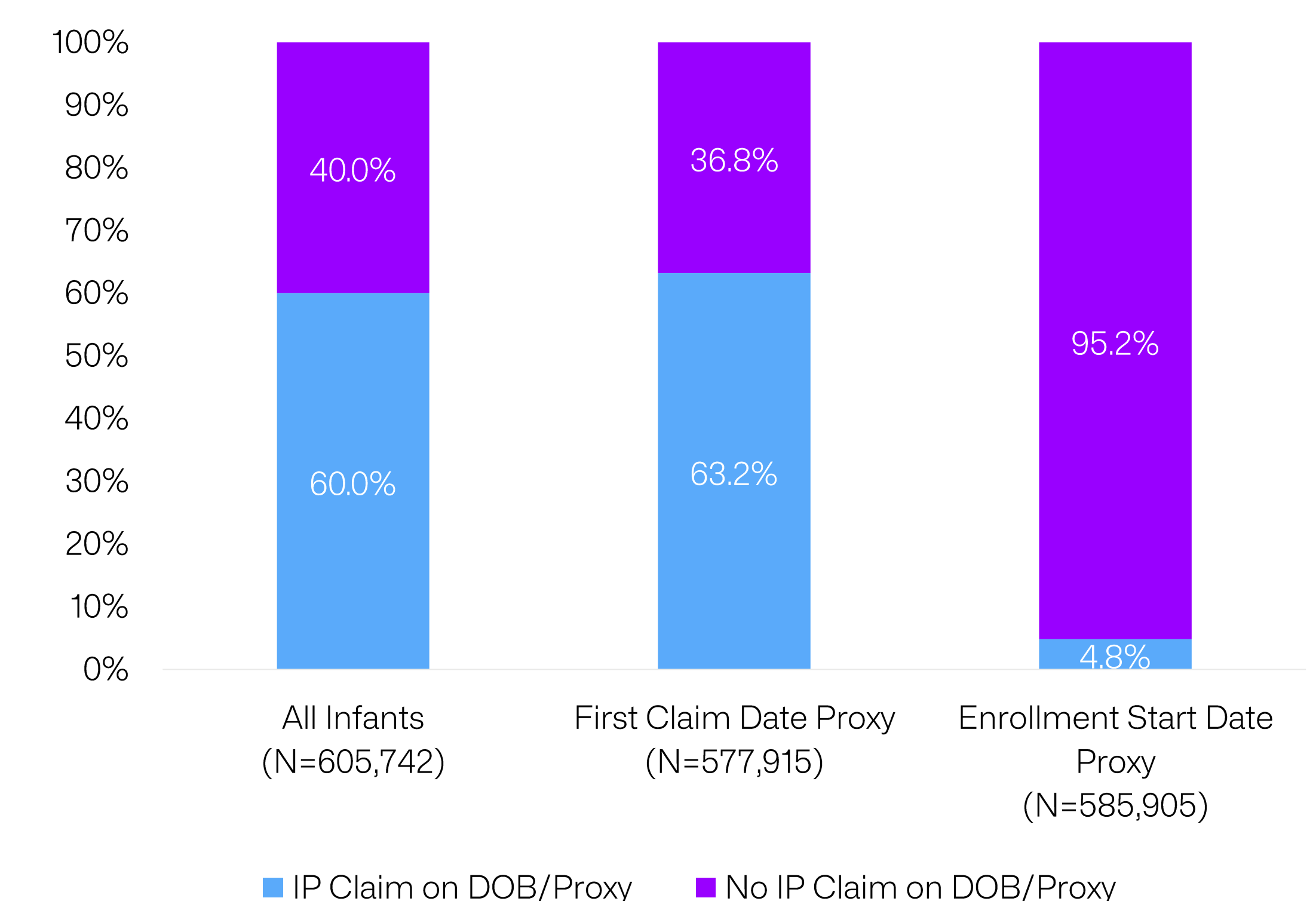


Table 2. Differences between First Claim Date and Enrollment Start Date Proxies (N=559,171)

	N/Mean/Median	%/SD/IQR
Days between claim date and enroll date (Mean, SD) Median, IQR	17.5 13	21.4 16
Claim date on enroll date (N,%)	23,134	4.1%
Claim date before enroll date (N,%)	188,896	33.8%
Days between claim date and enroll date (Mean, SD) Median, IQR	22 15	26 20
Claims between claim date and enroll date (Mean, SD) Median, IQR	5.0 5	4.6 3
Claim date after enroll date (N,%)	347,141	62.1%
Days between claim date and enroll date (Mean, SD) Median, IQR	16 12	18.3 15

Results (cont.)

- Agreement between claim date and enrollment start date proxies was low; only 4.1% of infants with both proxies had the same date. About one third of infants had claims before their enrollment start date. In these infants, the first claim occurred an average of 22 days (SD: 26) before the enrollment start date and an average of 5 claims (SD: 4.6) before the enrollment start date (Table 2)

Conclusions

- DOB proxies often incorrectly estimate date of birth in infants. Though the first claim date proxy performed better than enrollment date proxy, these also failed to correctly assign DOB in many infants and often incorrectly identified the birth hospitalization.
- For many infants, DOB proxies also incorrectly identified the neonatal period by 26-48 days on average.
- Use of enrollment start date as a proxy for exact DOB may further misclassify outcomes in the neonatal period as about one third of infants have medical claims before their enrollment start date.

References

- Pharmacoeconom Drug Saf. 2019 Sep;28(9): 1211-1221.
- BMC Med Res Methodol. 2023; 23:246.

Disclosure

Elizabeth Packnett, George Shrady, and Liisa Palmer are employees of Merative. This study was funded by Merative.



Background

- Infant date of birth (DOB) is an important variable when measuring neonatal outcomes, including birth defects, vaccination, and hospitalization.
- Exact DOB is often unavailable in deidentified databases. DOB proxies can estimate DOB in infants when exact DOB is not available. [1,2].
- Though discrepancies between exact DOB and estimated DOB may be small, even small differences can result in misclassification of infant outcomes, particularly in the neonatal period (four weeks following DOB) and newborn period (three months following DOB).

Objective

- To compare exact DOB to estimated DOB using date of first infant claim and enrollment start date as proxies for DOB.