

# Surfactant use among neonates in the United States: An analysis using the CDC WONDER database

Wenhao Wang<sup>1</sup>, Daniel Fuentes<sup>1</sup>, Xuezheng Sun<sup>1</sup>

<sup>1</sup>Chiesi USA Inc, Cary, North Carolina

## BACKGROUND:

- Previous studies have described the temporal trends and geographic distribution of births by gestational age in the United States.<sup>1</sup>
- Surfactant replacement therapy remains a critical treatment for respiratory distress syndrome in premature babies, leading to improved outcomes and reduced complications.<sup>2,3</sup>
- However, with recent shifts in birth trends and clinical practice, there is limited data available on how surfactant use has changed over time and across the different regions in the US.
- This study analyzed US national data on surfactant use across GAs to better understand evolving clinical practices in preterm and term infants.

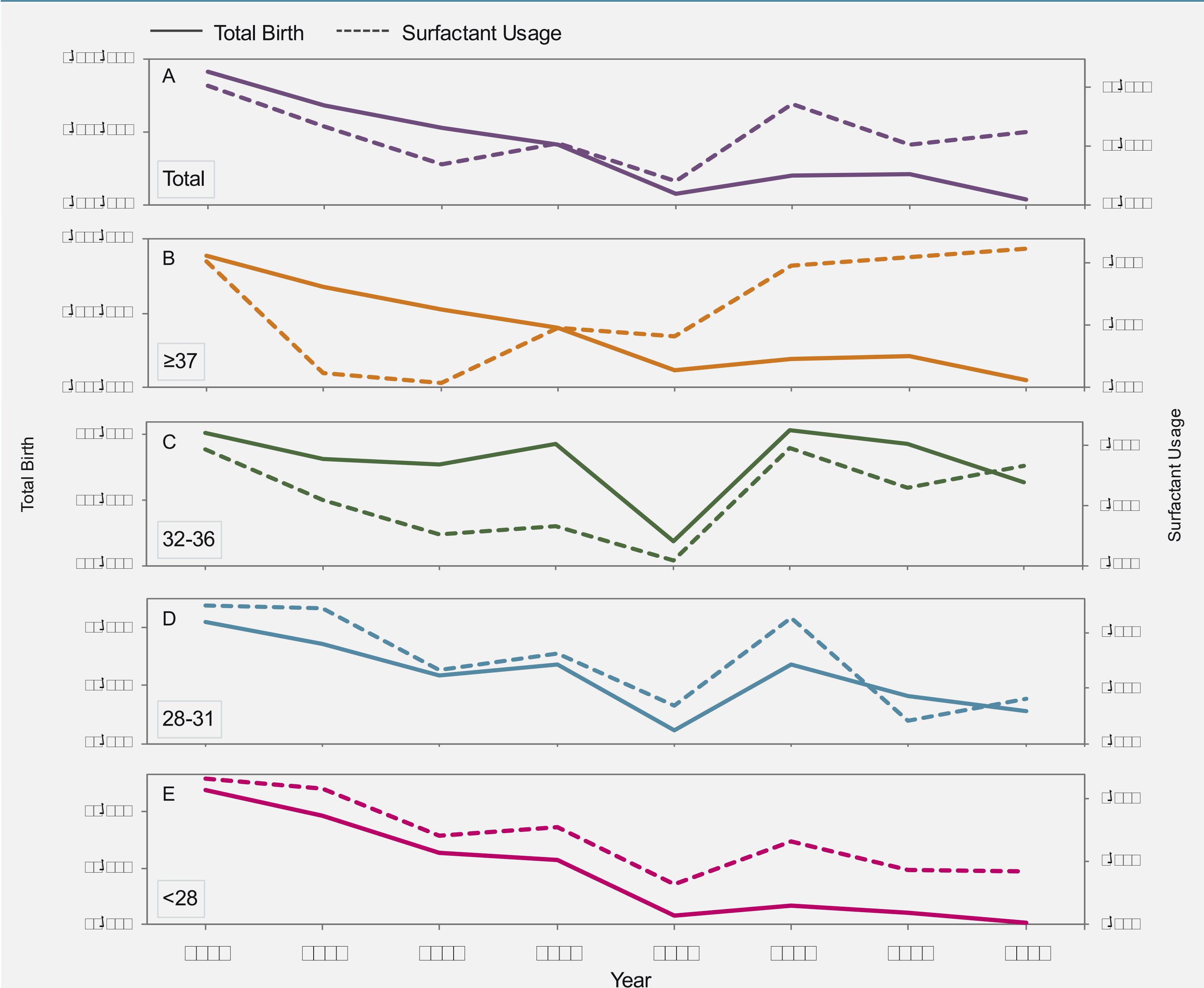
## METHODS:

- The CDC WONDER database compiles birth certificate records of infants born to US residents and health-related characteristics provided by the US Department of Health and Human Services, Centers for Disease Control and Prevention, and the National Center for Health Statistics.
- We conducted a retrospective analysis of aggregated data on live births and surfactant use (yes/no) within the US from 2016 to 2023, using public health data housed in the CDC WONDER Natality online databases.
- Surfactant cases were identified based on the 'surfactant replacement therapy' variable (yes/no) within the 'abnormal conditions of newborn' section.
- Data was stratified by gestational age (extremely preterm [ $<28$  weeks], very preterm [28–31 weeks], moderately/late preterm [32–36 weeks], term neonates [ $>37$  weeks]), and state to enable detailed analysis across these variables.

## RESULTS:

- The total number of births in the US steadily decreased from 2016 to 2020 and was relatively stable thereafter (solid line in **Figure 1A**).
  - The largest decrease was among extremely preterm neonates ( $<28$  weeks,  $-13.3\%$ ; **Figure 1E**) and the smallest among moderate/late preterm neonates (32–36 weeks:  $-2.4\%$ ; **Figure 1C**).
- The total number of infants receiving surfactant therapy decreased from 2016 to 2020 (especially in 2020 potentially related to COVID-19); following this period, surfactant therapy use increased (**Figure 1A**). Trends varied significantly across GA groups (dashed lines **Figure 1B-E**):
  - After 2016, surfactant usage was observed to increase in moderate/late preterm (32–36 weeks,  $\Delta=141$ ,  $2.6\%$ ; **Figure 1C**) and term neonates ( $>37$  weeks,  $\Delta=484$ ,  $19\%$ ; **Figure 1B**) and decrease in extremely preterm ( $<28$  weeks,  $\Delta=-322$ ,  $-5.8\%$ ; **Figure 1E**) and very preterm (28–31 weeks,  $\Delta=-410$ ,  $-8.4\%$ ; **Figure 1D**) neonates.

**Figure 1. Births (solid lines) and surfactant cases (dashed lines) in total (A) and by GA groups (B–E).**

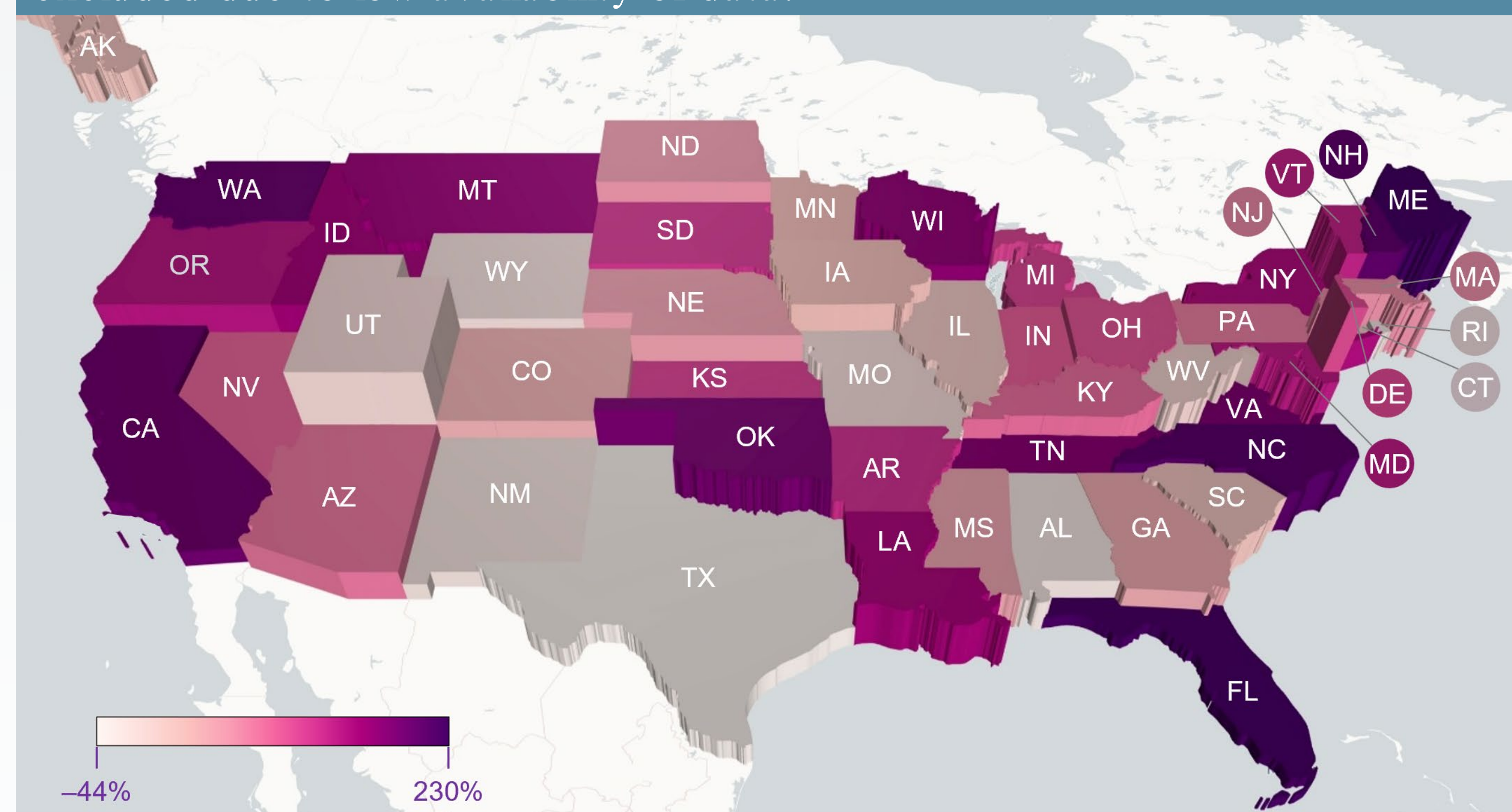


- The percentage of surfactant cases varied across the states (height, **Figure 2**). From 2016 to 2023, the number of surfactant cases increased in 19 states but decreased in 30 states (color **Figure 2**).

**References:** 1. Byrnes J, et al, Population Research. 2015 Mar;77:836-844 2. Polin RA, et al. Pediatrics. 2014 Jan;133(1):156-63 3. Ng EH, et al. Paediatr Child Health. 2021 Feb 1;26(1):35-49.

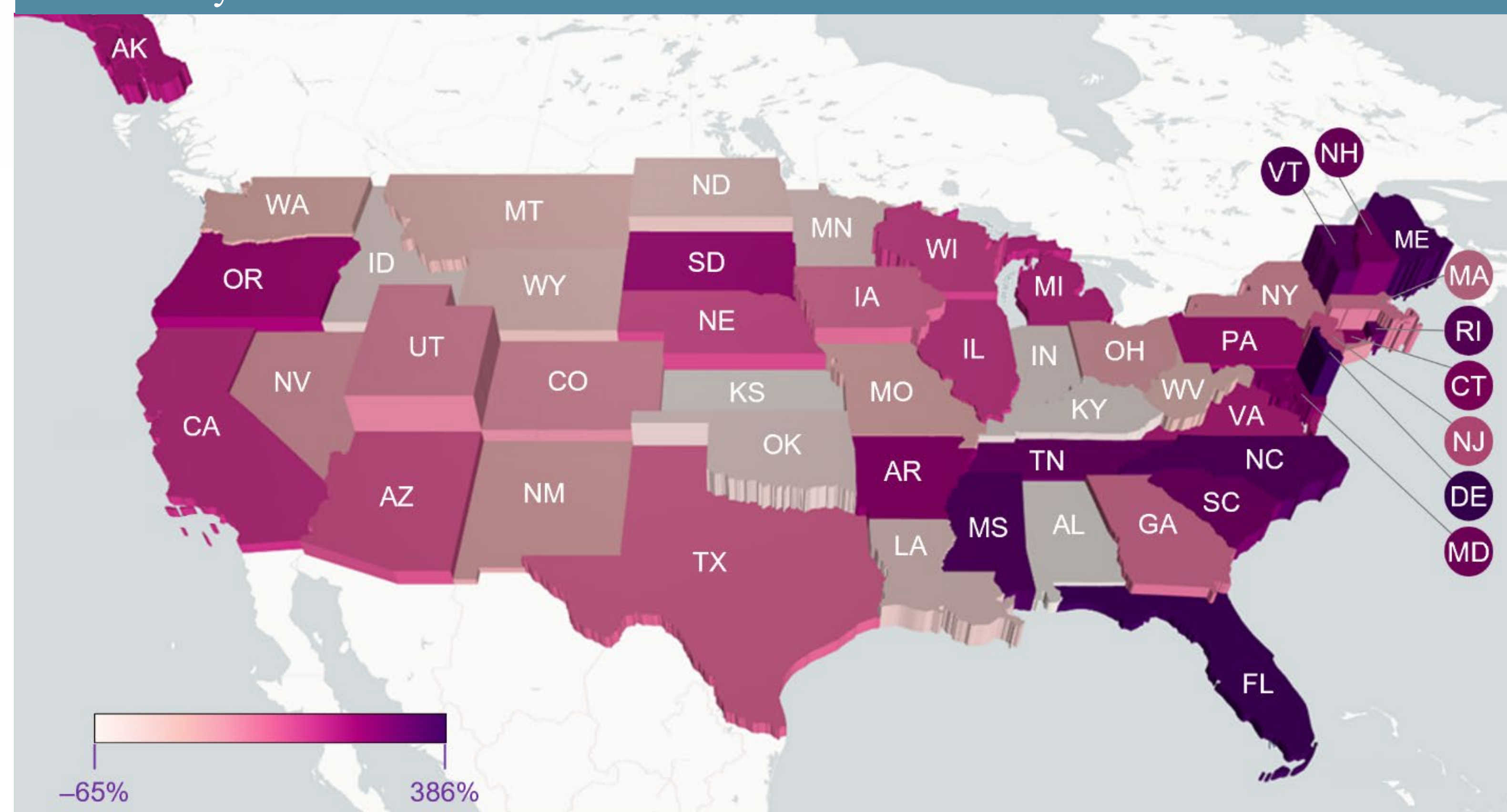
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**Figure 2. Surfactant uses by states.** The height of each state indicates the percentage of surfactant cases in 2023; the color scale shows the increment % from 2016 to 2023. Hawaii and the District of Columbia are excluded due to low availability of data.



- For moderate preterm to full-term infants ( $\geq 32$  weeks GA), the percentage of surfactant use cases also varied across states (height, **Figure 3**). From 2020-2023, the number of surfactant cases increased in 32 states but decreased in 17 (color, **Figure 3**).
- While the overall surfactant use decreased or remained stable in Delaware, Mississippi, Rhode Island, and South Carolina from 2016 to 2023 (**Figure 2**), these states ranked among the top 10 for increased surfactant use in moderate/late preterm infants from 2020 to 2023 (**Figure 3**).

**Figure 3. Surfactant use among moderate preterm to full-term infants (GA  $\geq 32$  weeks) by state.** The height of each state indicates the percentage of surfactant cases in 2023; the color scale shows the increment % from 2020 to 2023. Hawaii and the District of Columbia are excluded due to low availability of data.



## CONCLUSION:

- This analysis of surfactant use in neonates reveals a relative shift in usage from extremely and very preterm neonates to moderate/late preterm and term neonates.
- Further studies are needed to further explore and understand the underlying mechanisms and clinical implications of the observed trends.

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