

# Maternal and Child Health Outcomes Associated with Gestational Weight Gain by Body Mass Index: A Scoping Review

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*I have nothing to disclose.*

The hard work for this review was conducted by  
NAM staff members:

Jennifer Stephenson  
Alice Vorosmarti  
Ann Yaktine  
Melanie Arthur  
Sarah Poncet  
Anne Marie Houppert



As well as:

Heather Hamner (CDC)  
Kathleen Rasmussen (Planning Committee Chair)

# Rationale

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## What was the objective of the scoping review?

To determine the amount of available evidence on maternal and child health outcomes related to weight gain during pregnancy, stratified by BMI category, since release of the 2009 guidelines.

*Focus:* individuals with obesity, overweight or underweight.

# Rationale

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To determine the amount of available evidence on maternal and child health outcomes related to weight gain during pregnancy, stratified by BMI category, since release of the 2009 guidelines.

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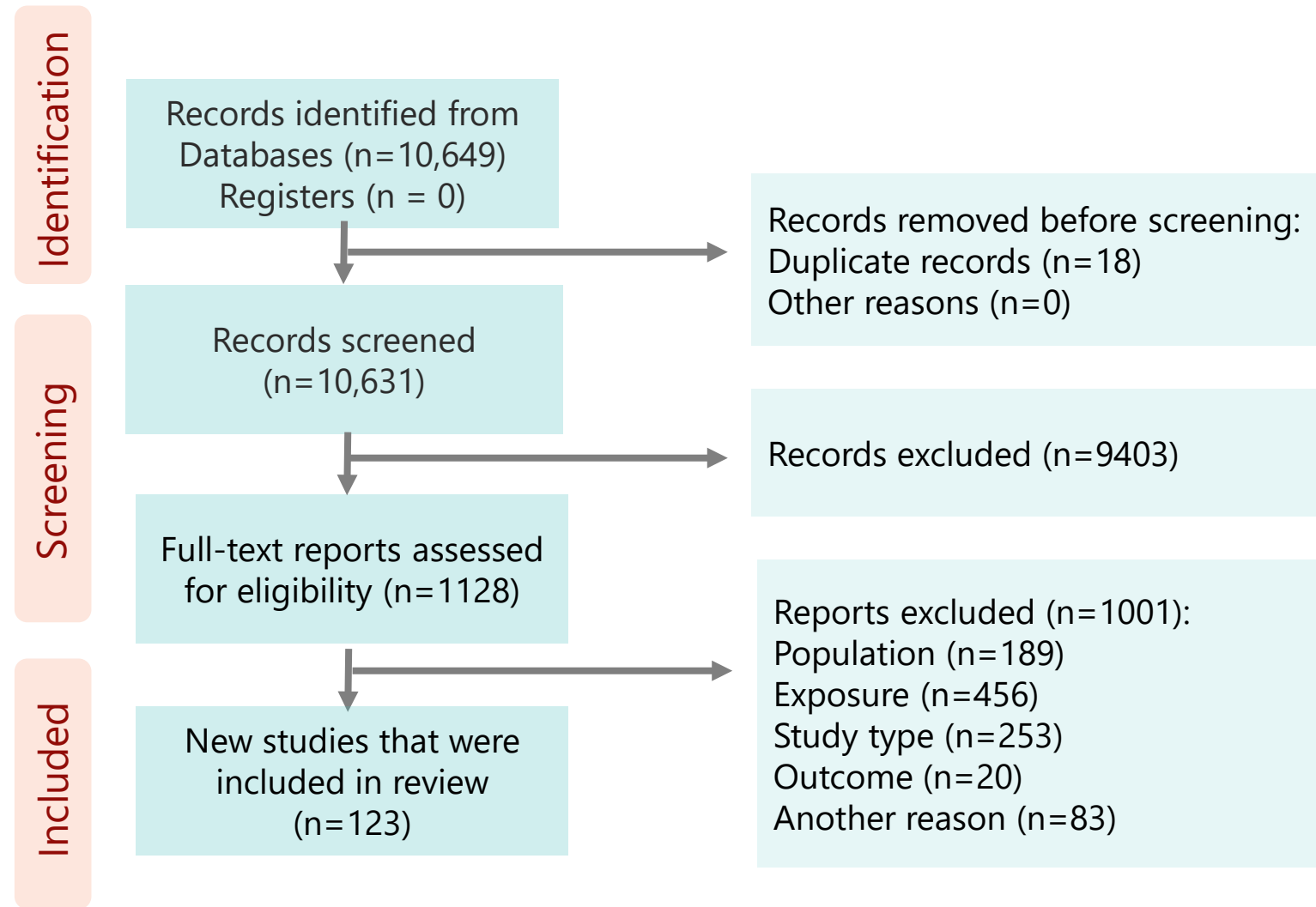
*The full report is available on the  
webpage for today's workshop!*

## Search protocol and eligibility criteria

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- ✓ Peer-reviewed primary articles in English
- ✓ January 2008 and March 2025
- ✓ Studies of gestational weight gain in adult women and their children (0-18 yrs)
- ✓ Prepregnancy or early pregnancy BMI  $<18.5$  or  $>24.9$  kg/m<sup>2</sup>
- ✓ Stratified by BMI category
- ✓ Maternal outcomes: antepartum, intrapartum, postpartum, longer-term
- ✓ Infant outcomes: fetal, birth, infant, child (0 to 18 yr)

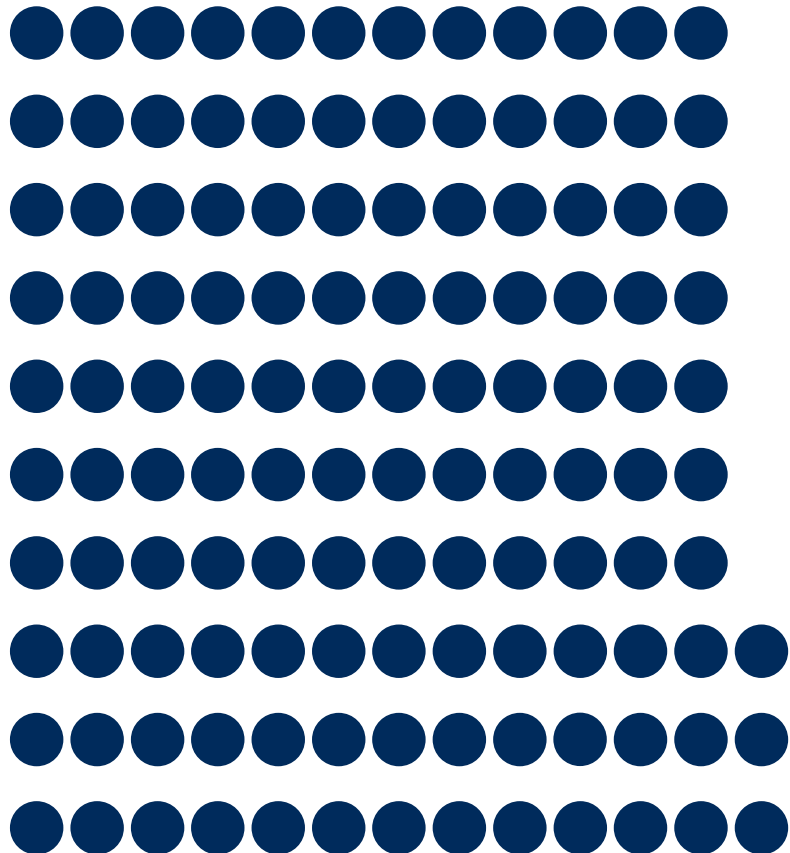
# Identification of new research via databases and registers



# Results

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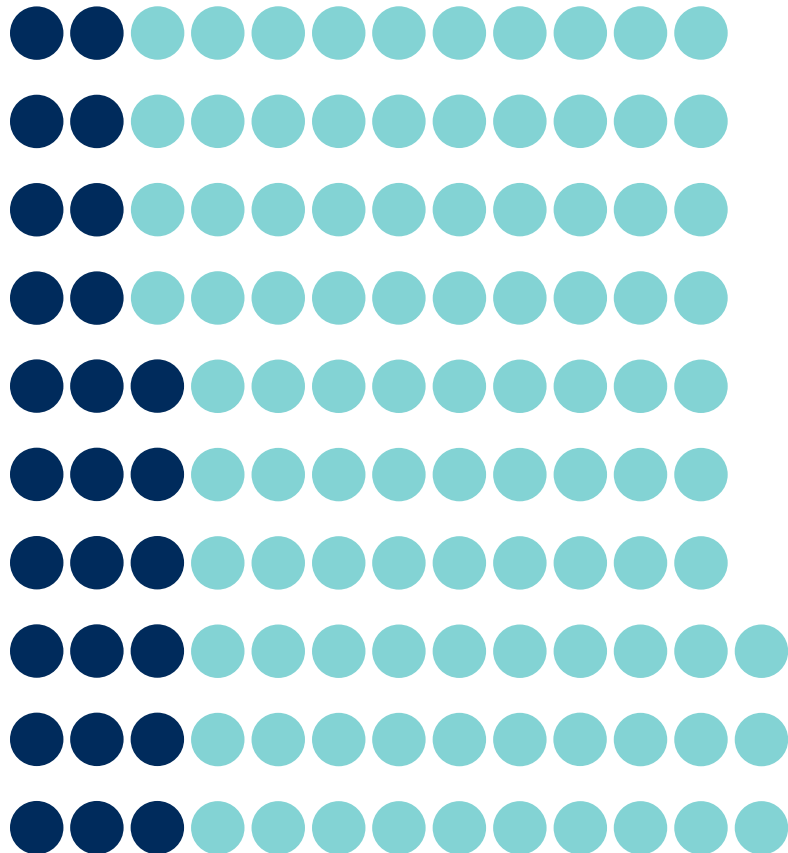
n = 123 unique articles



## Results

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n = 123 unique articles

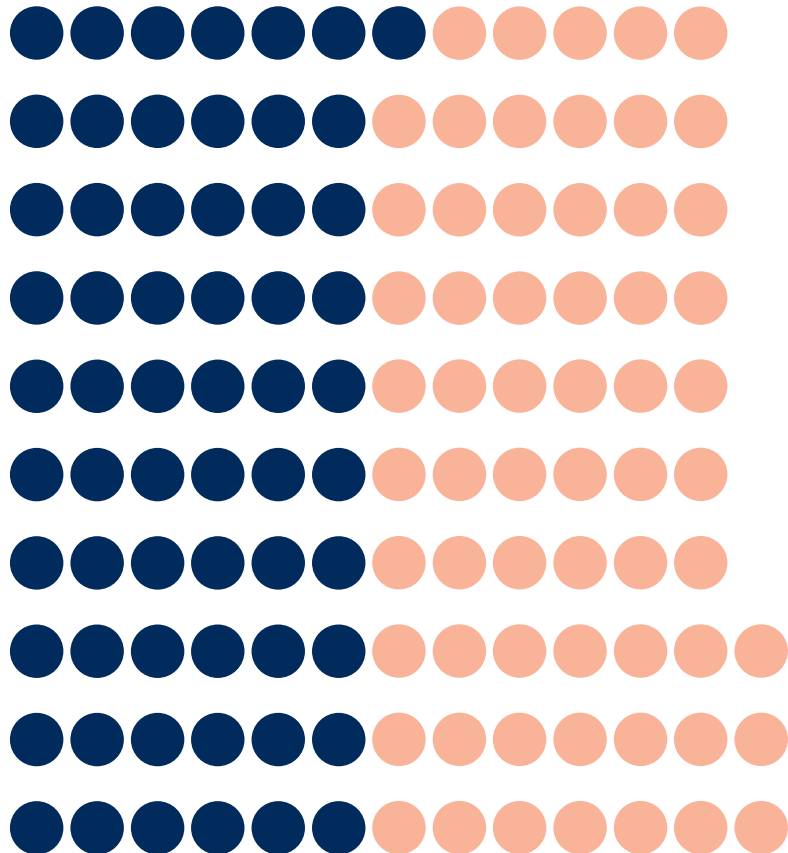


n = 97 with an infant/child outcome

# Results

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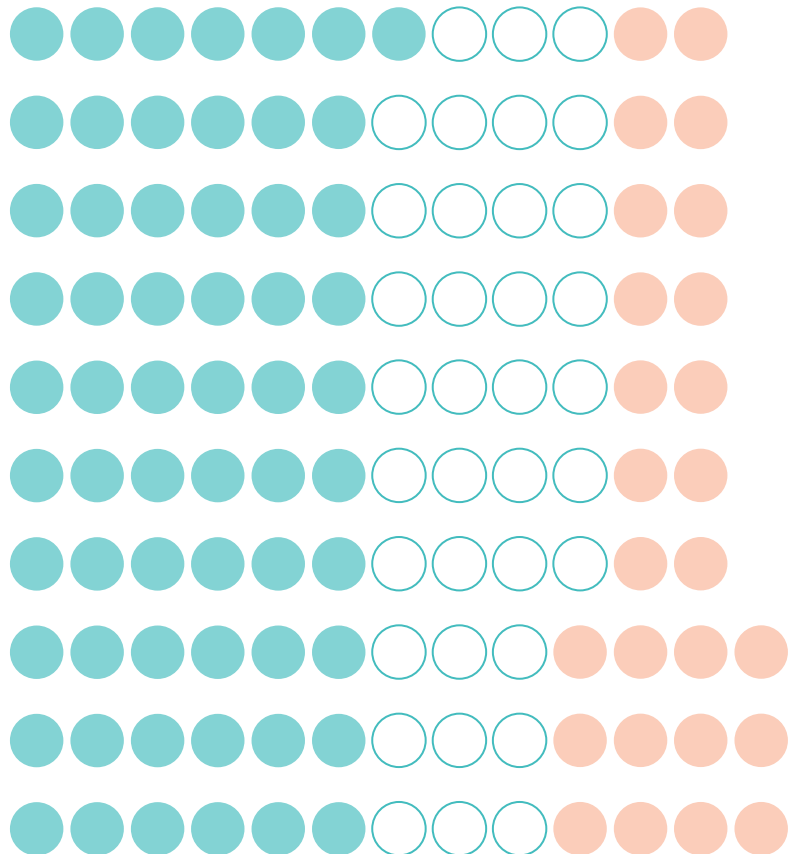
n = 123 unique articles



n = 62 with a maternal outcome

# Results

n = 123 unique articles



n = 61 with ONLY infant/child

n = 26 with ONLY maternal

n = 36 with BOTH maternal and child

## Results

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Articles accounting for the impact of gestational age on associations between pregnancy weight gain and outcomes

Duration of gestation



Pregnancy weight gain

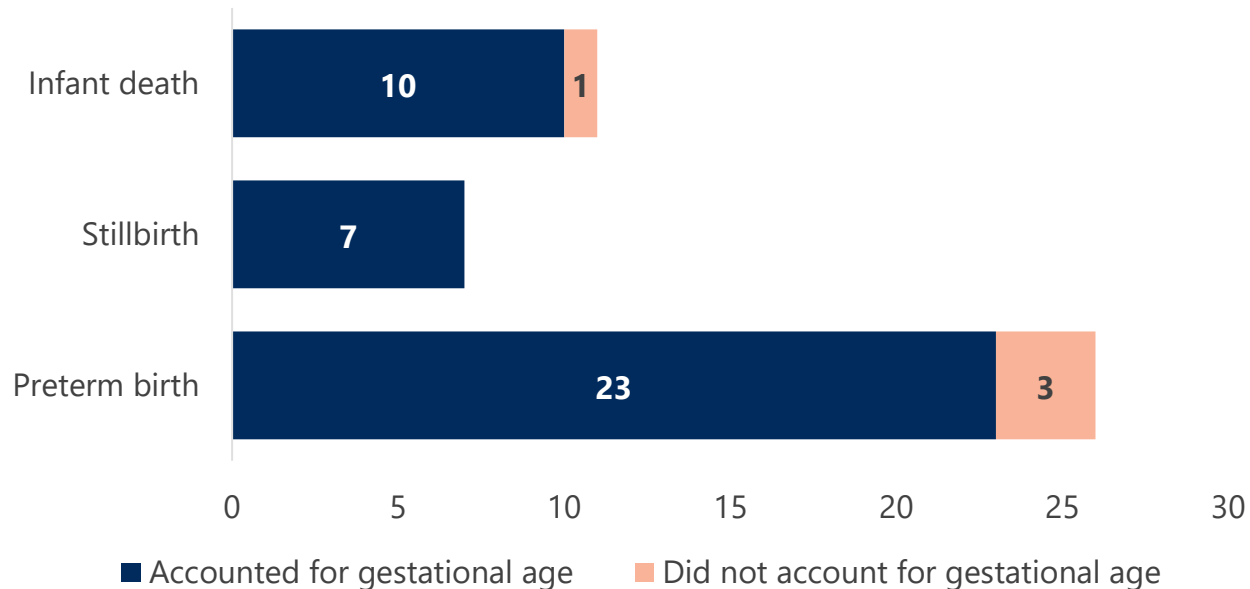
# Results

Articles accounting for the impact of gestational age on associations between pregnancy weight gain and outcomes

Duration of gestation



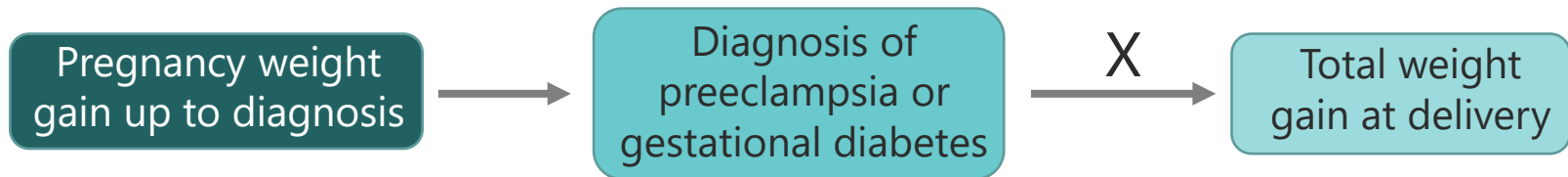
Pregnancy weight gain



## Results

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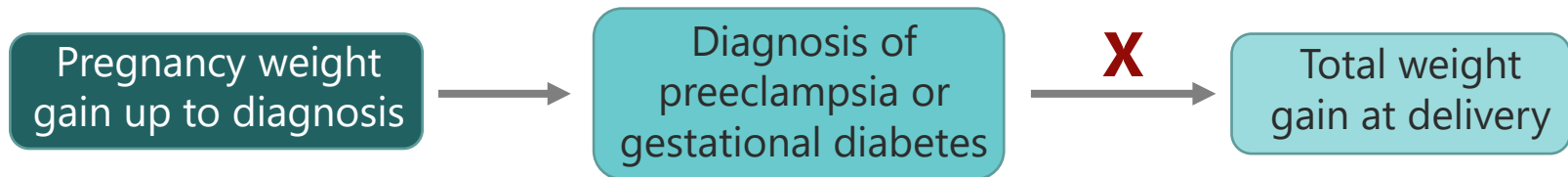
**Preeclampsia** and **gestational diabetes** in relation to total weight gain:  
a problem of reverse causality



## Results

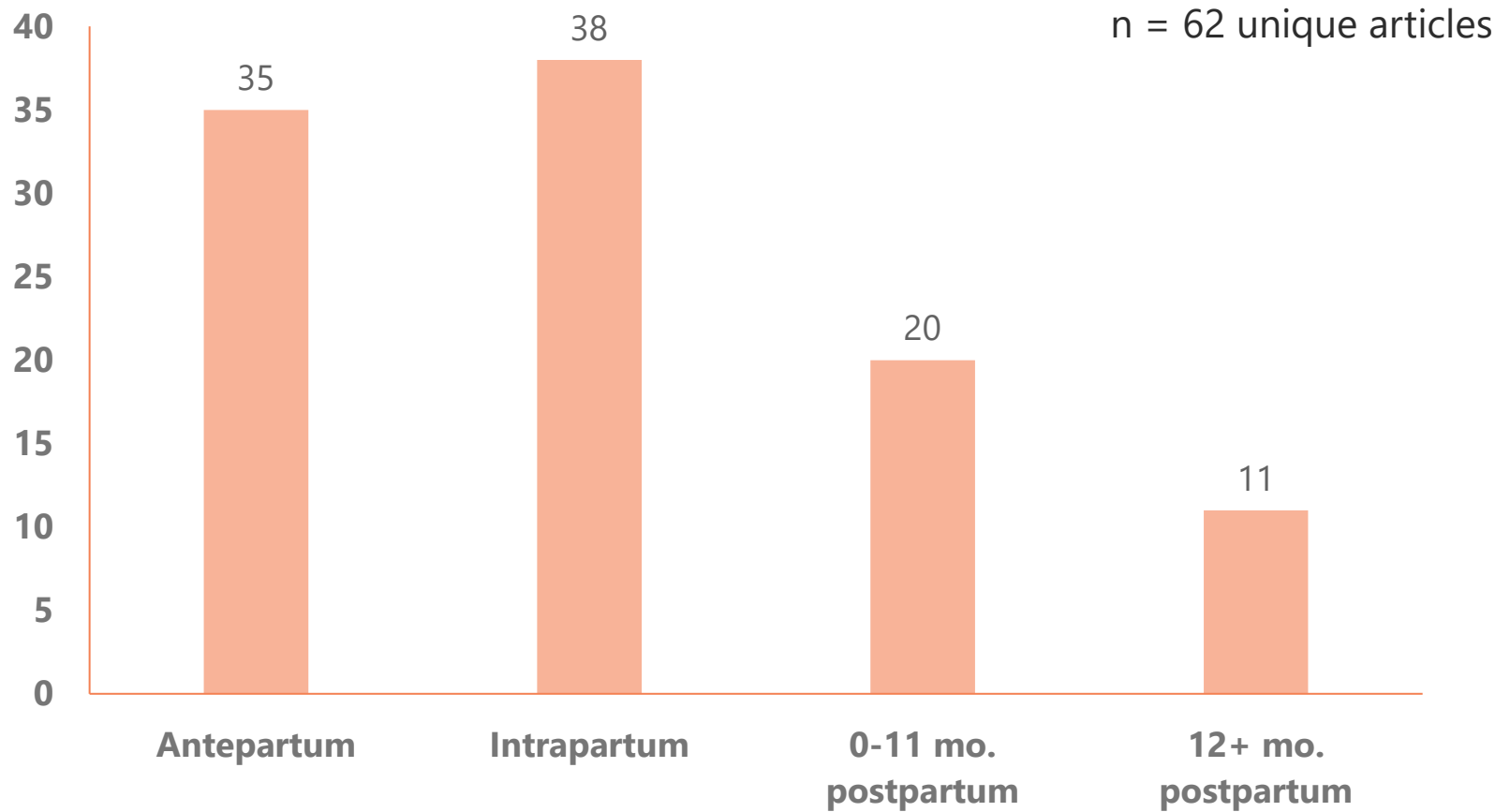
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**Preeclampsia** and **gestational diabetes** in relation to total weight gain:  
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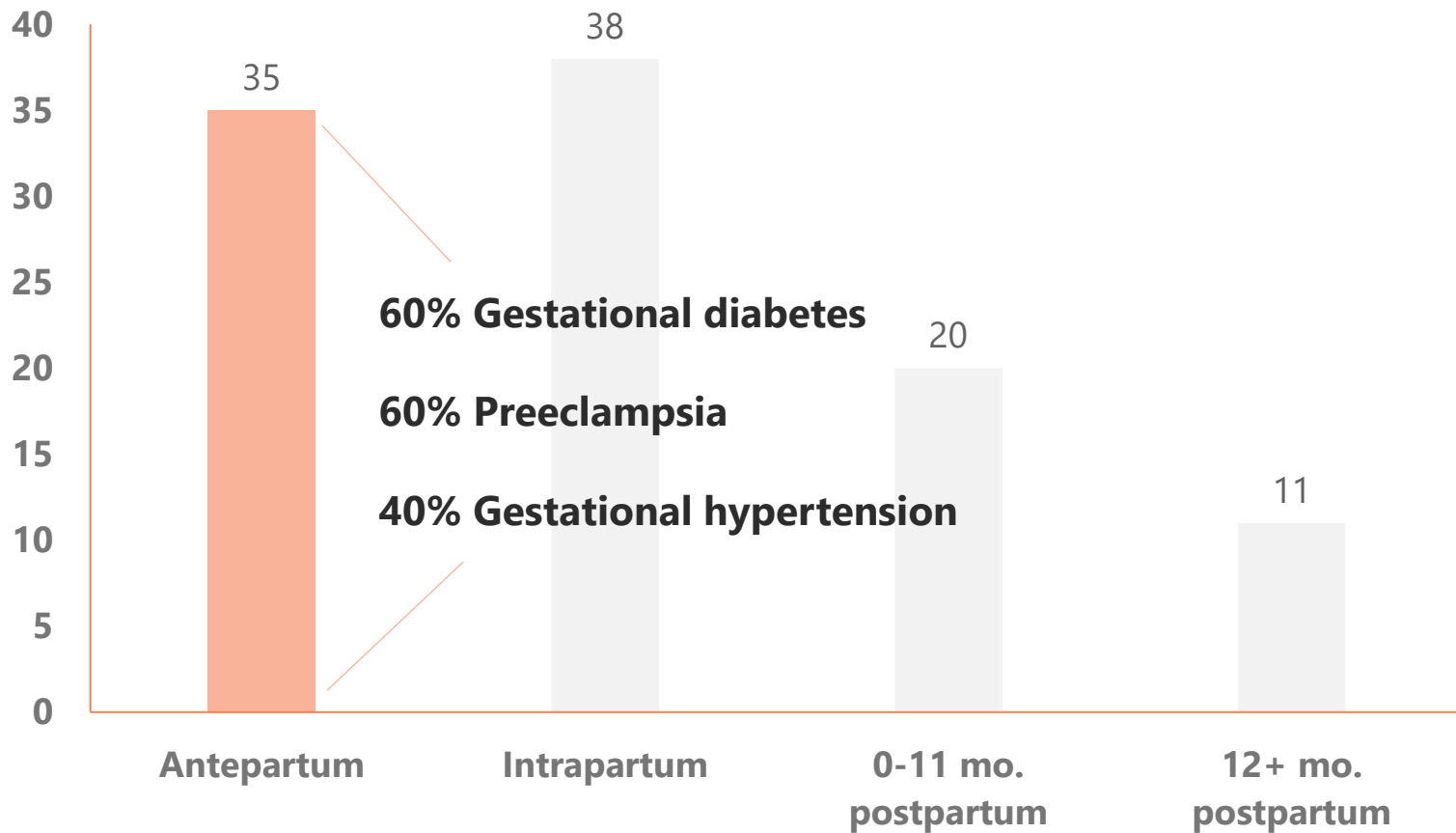
# Results

Number of articles with **maternal** outcomes in each time period



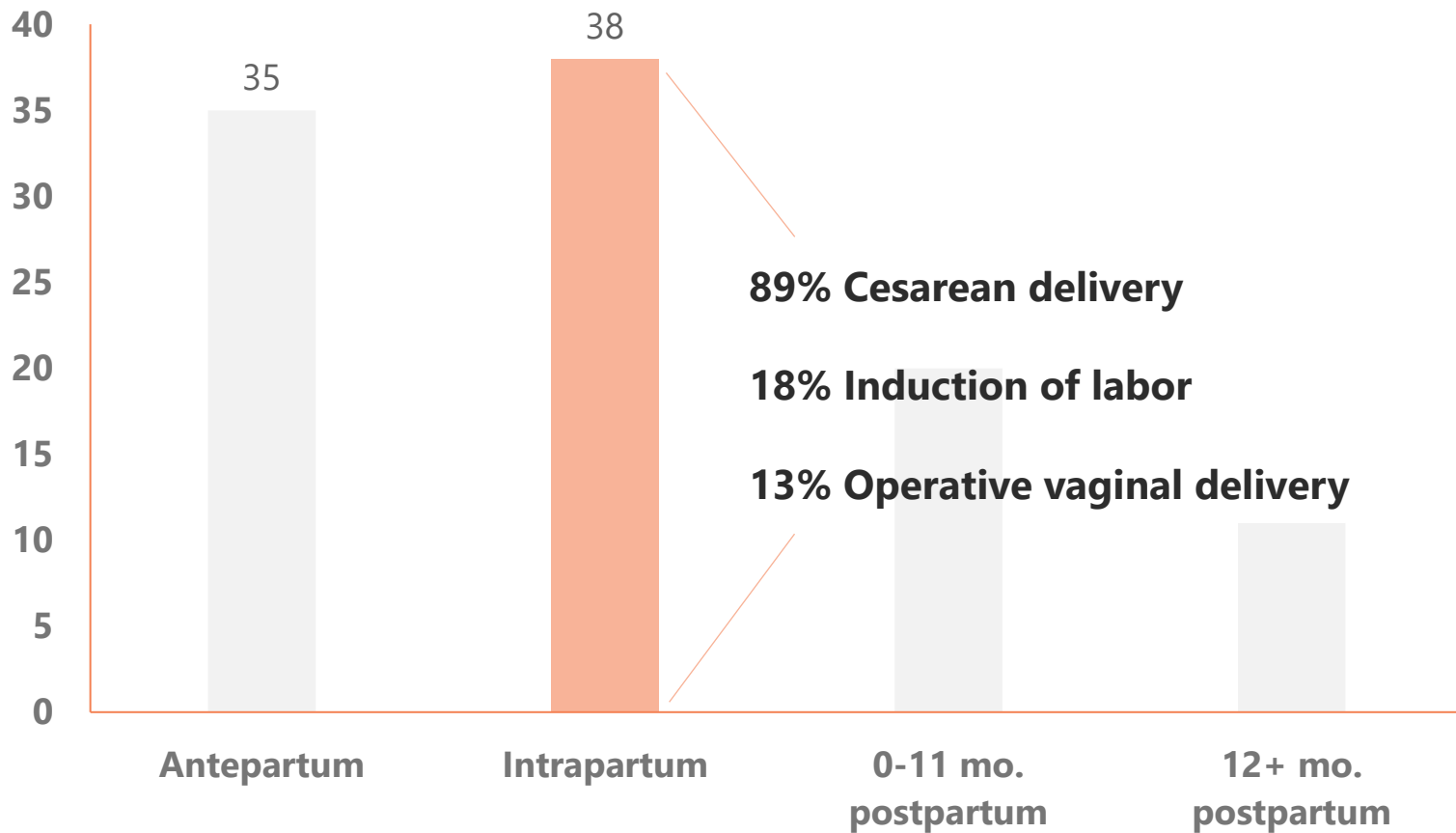
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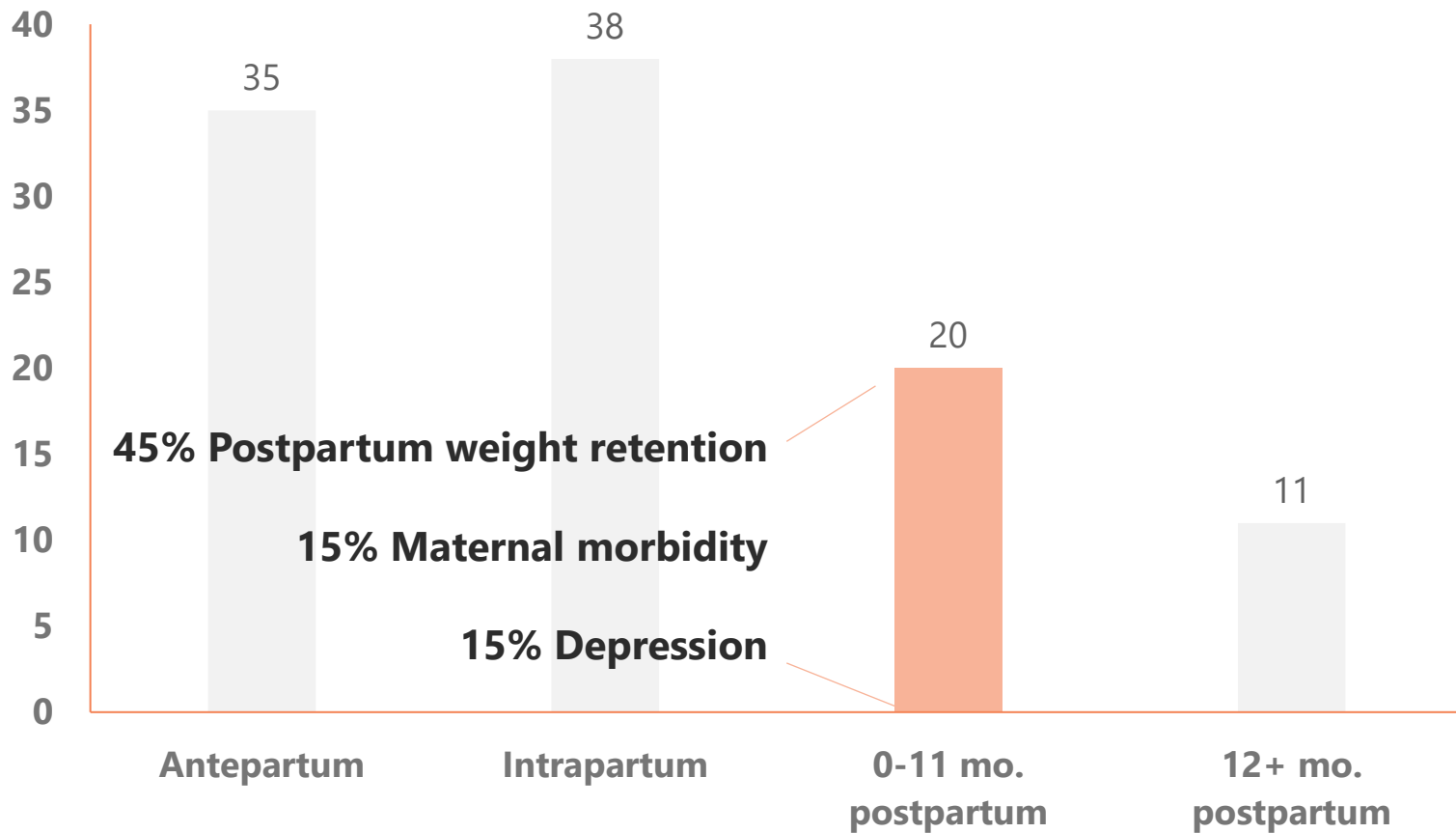
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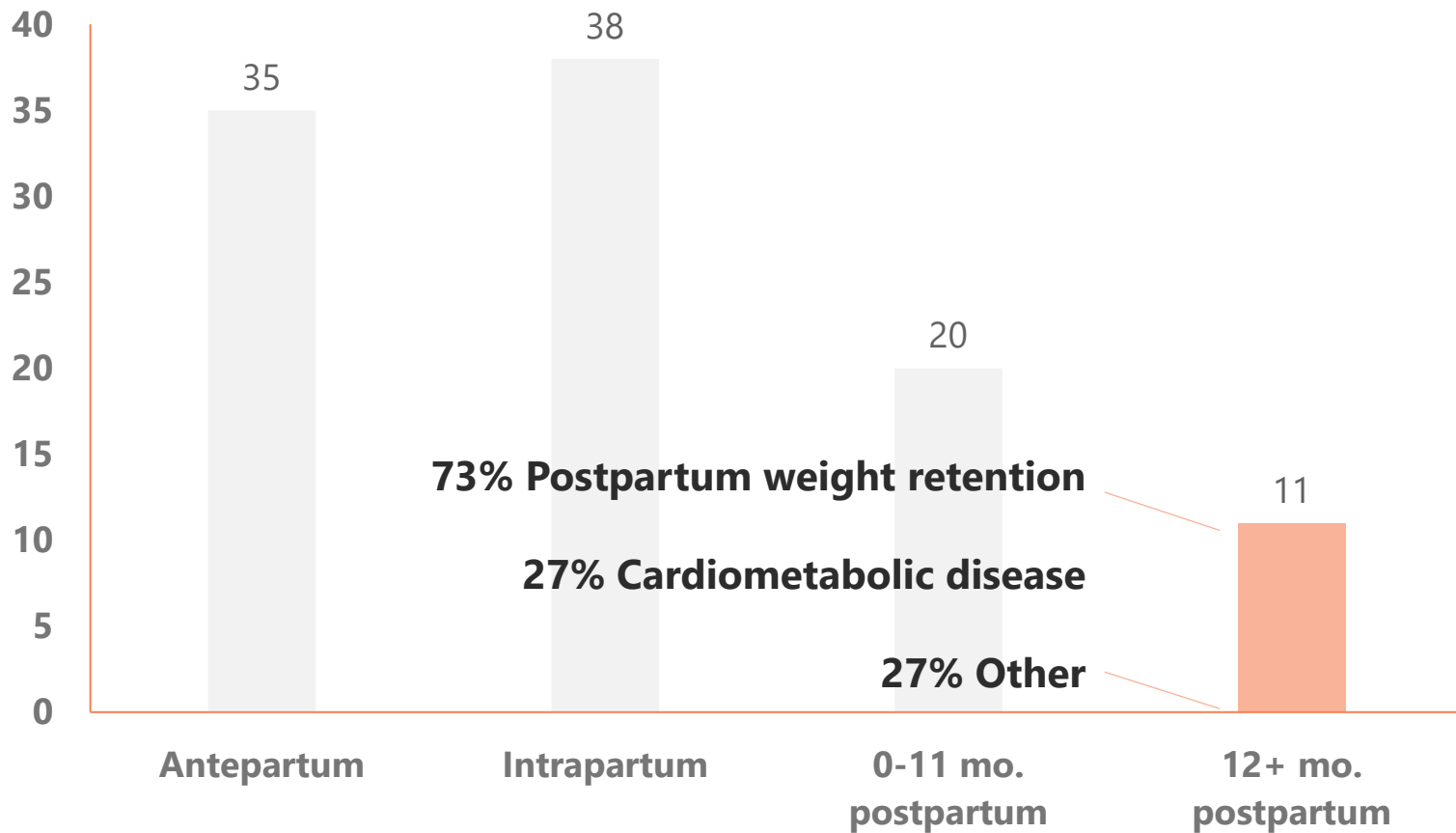
# Results

Number of articles with **maternal** outcomes in each time period



# Results

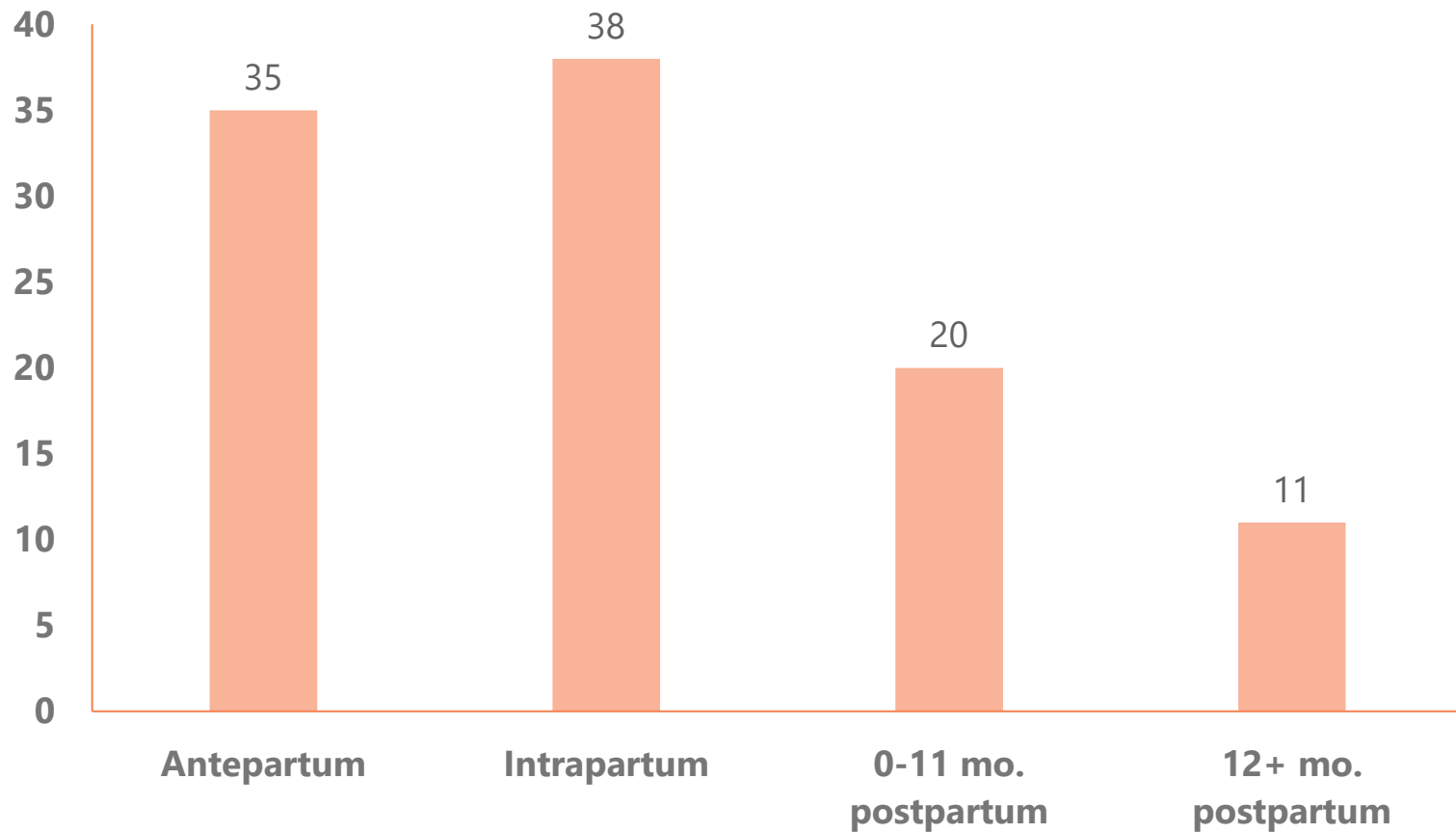
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## Results

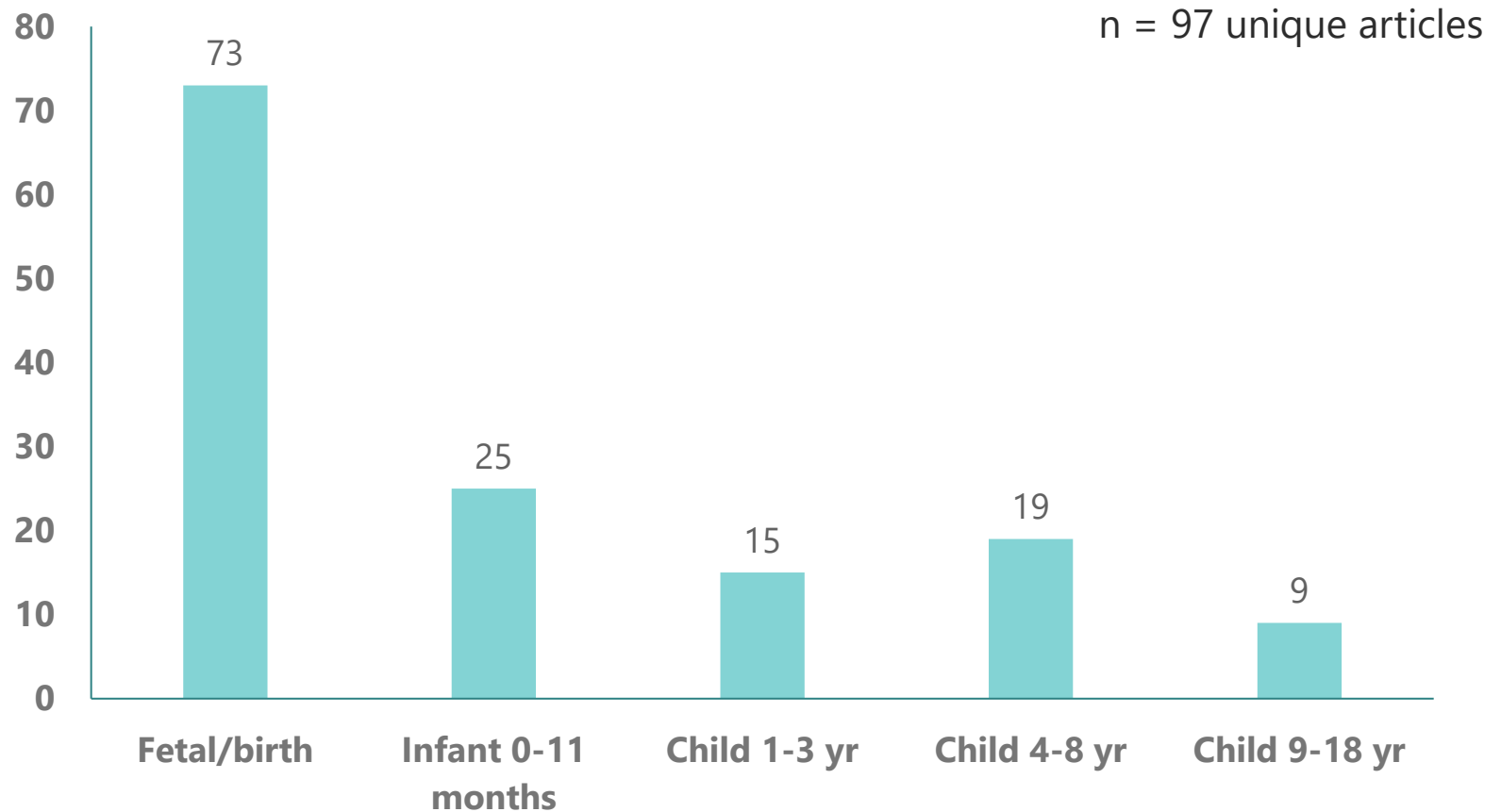
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Number of articles with **maternal** outcomes in each time period



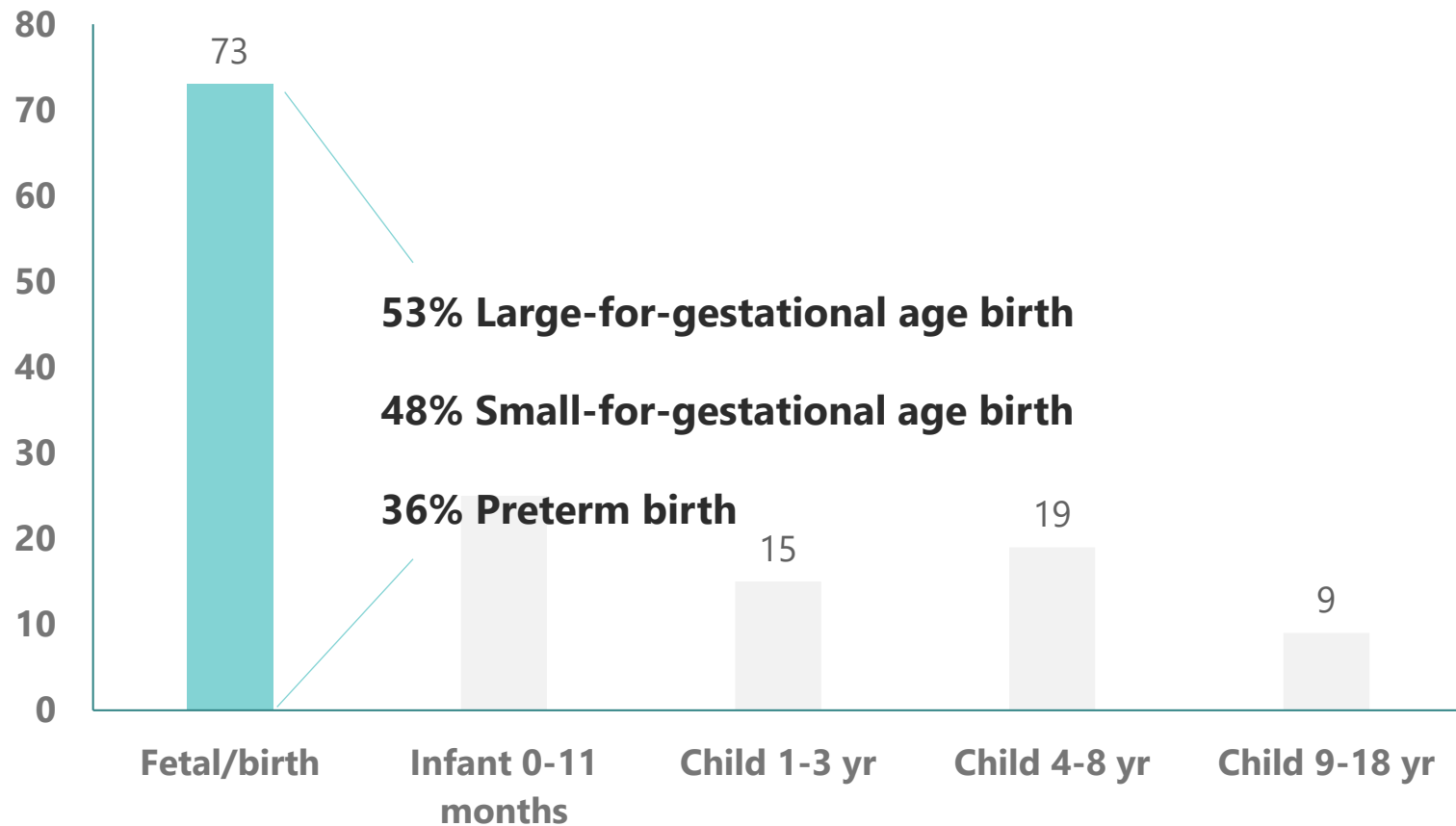
## Results

Number of articles with **infant/child** outcomes in each time period



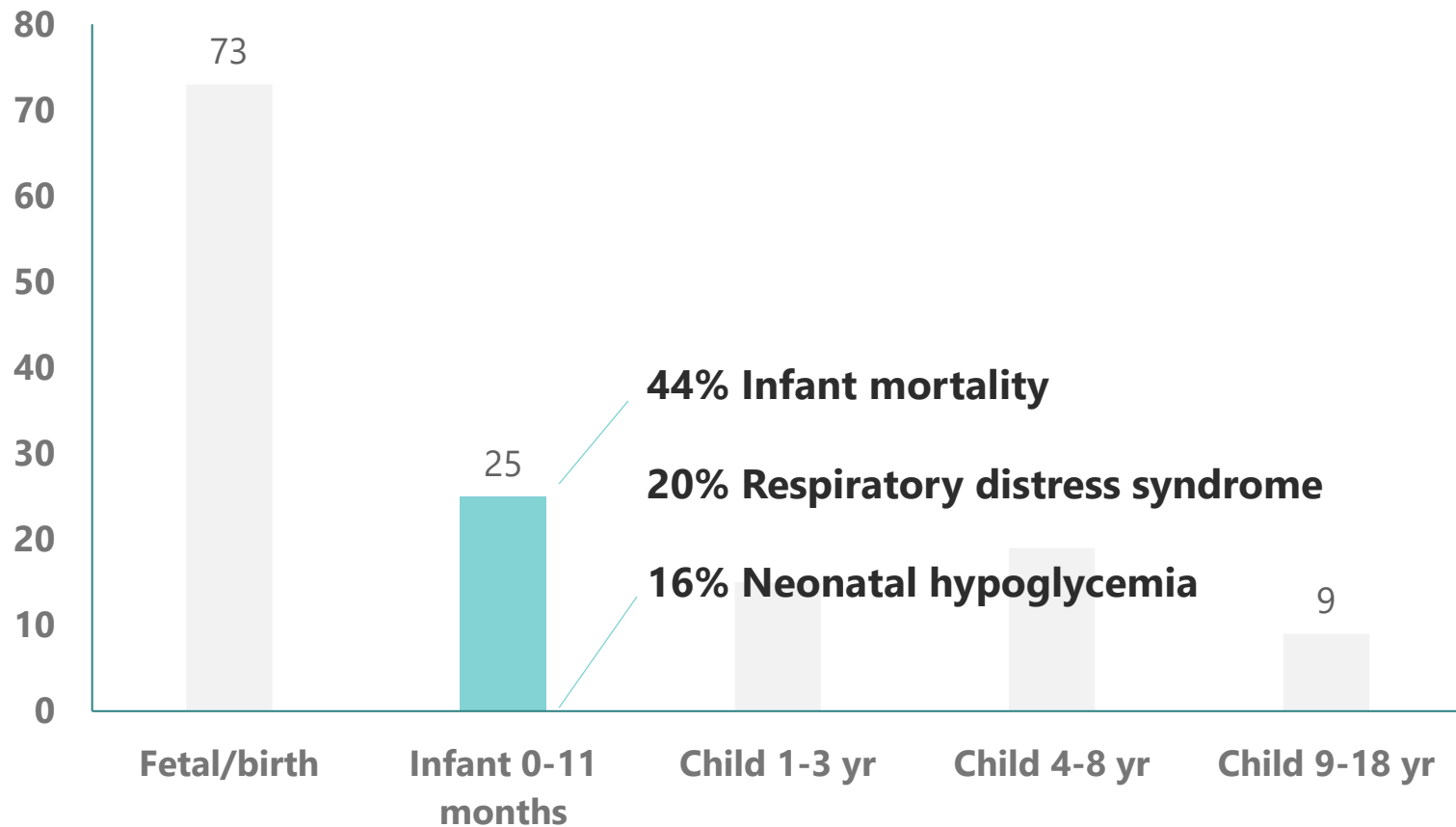
# Results

Number of articles with **infant/child** outcomes in each time period



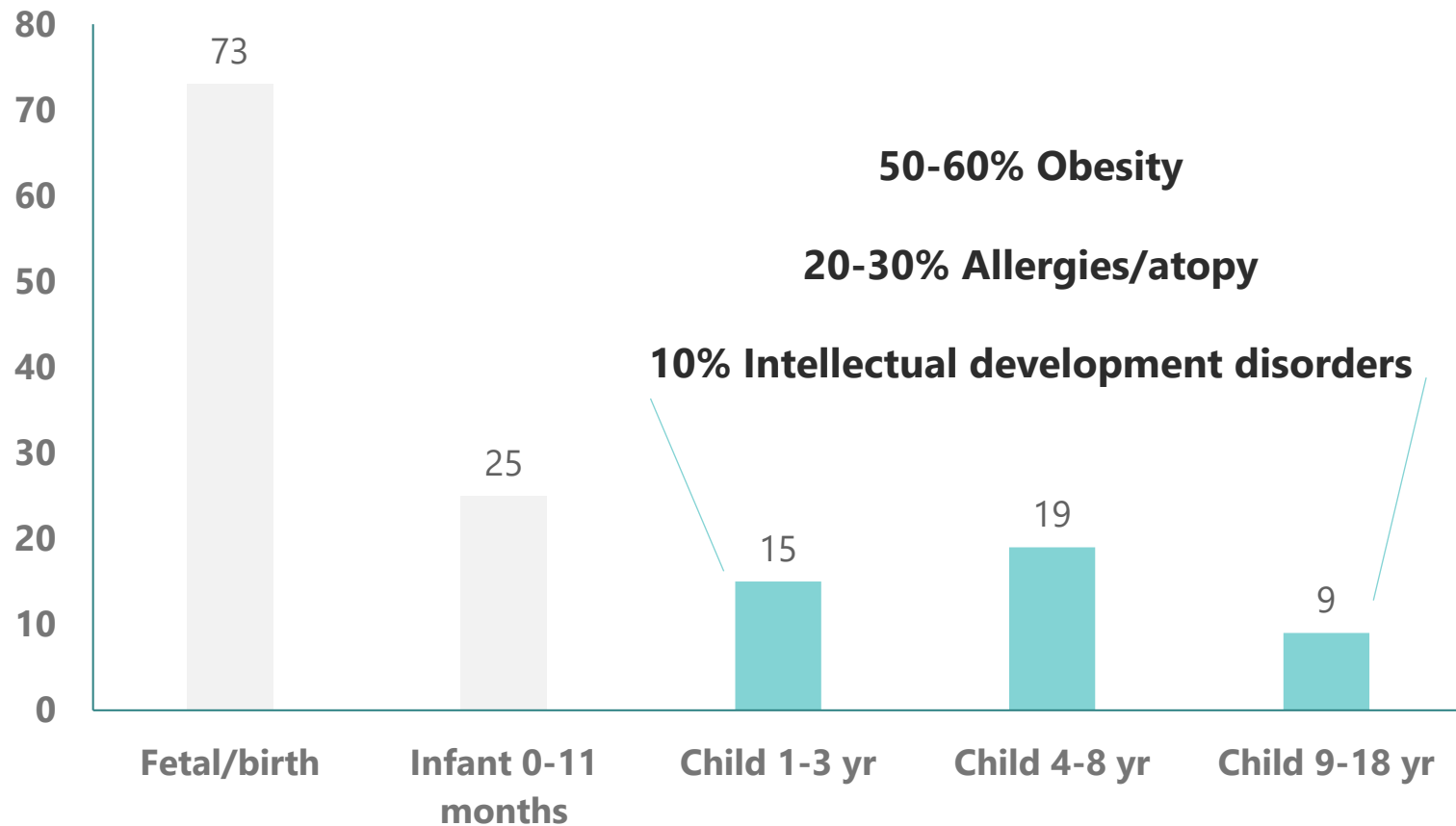
# Results

Number of articles with **infant/child** outcomes in each time period



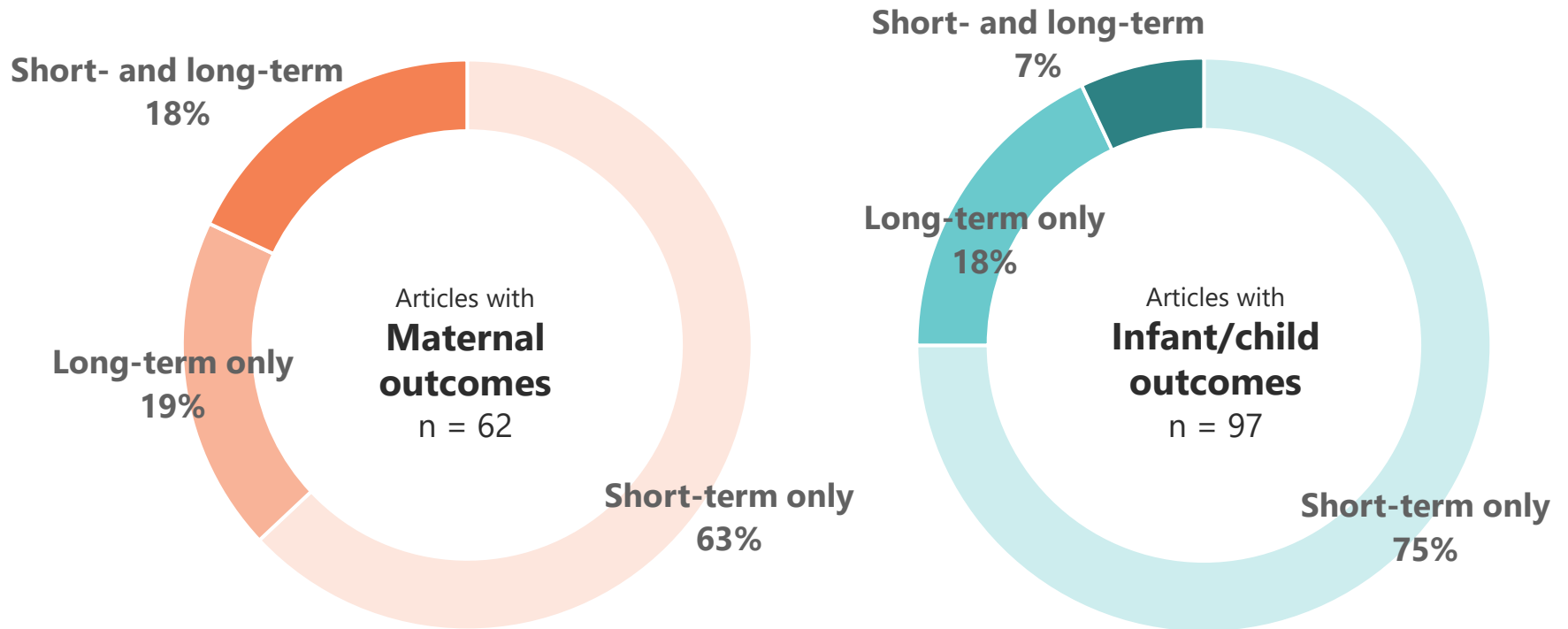
# Results

Number of articles with **infant/child** outcomes in each time period



# Results

Number of articles with **short- or long-term** outcomes



# Results

## Count of articles with the most common outcomes

| Ranking | Outcome                     | Count |
|---------|-----------------------------|-------|
| 1       | <b>Cesarean deliv</b>       | 68    |
| 2       | <b>LGA birth</b>            | 64    |
| 3       | <b>SGA birth</b>            | 56    |
| 4       | <b>Birthweight</b>          | 48    |
| 5       | <b>Preterm birth</b>        | 47    |
| 6       | <b>Gest Diabetes</b>        | 42    |
| 7       | <b>Preeclampsia</b>         | 27    |
| 8       | <b>Macrosomia</b>           | 25    |
| 9       | <b>Gestational HTN</b>      | 23    |
| 10      | <b>NICU admission</b>       | 22    |
| 11      | <b>PPWR 0-11 mo</b>         | 22    |
| 12      | <b>Infant death</b>         | 18    |
| 13      | <b>Child obesity 4-8 yr</b> | 18    |
| 14      | <b>Child obesity 1-3 yr</b> | 18    |
| 15      | <b>PPWR 12+ mo</b>          | 17    |
| 16      | <b>Stillbirth</b>           | 8     |

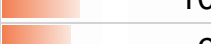
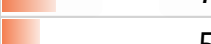
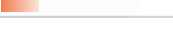
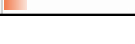
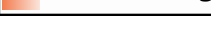
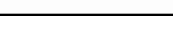
PPWR: postpartum weight retention

HTN: hypertension

LGA/SGA: large/small for gestational age

# Results

Count of articles with the most common outcomes, by BMI

|    | Outcome              | Prepregnancy BMI                                                                      |                                                                                          |                                                                                         |
|----|----------------------|---------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
|    |                      | Underwt                                                                               | Overwt                                                                                   | Obesity (all)                                                                           |
| 1  | Cesarean deliv       |  17  |  28   |  23  |
| 2  | LGA birth            |  17  |  27   |  20  |
| 3  | SGA birth            |  17  |  23   |  16  |
| 4  | Birthweight          |  20  |  18   |  10  |
| 5  | Preterm birth        |  16  |  20   |  11  |
| 6  | Gest Diabetes        |  11  |  19   |  12  |
| 7  | Preeclampsia         |  5   |  12   |  10  |
| 8  | Macrosomia           |  4   |  11   |  10  |
| 9  | Gestational HTN      |  5  |  10  |  8  |
| 10 | NICU admission       |  5 |  9  |  8 |
| 11 | PPWR 0-11 mo         |  6 |  9  |  7 |
| 12 | Infant death         |  5 |  7  |  6 |
| 13 | Child obesity 4-8 yr |  4 |  10 |  4 |
| 14 | Child obesity 1-3 yr |  4 |  9  |  5 |
| 15 | PPWR 12+ mo          |  5 |  7  |  5 |
| 16 | Stillbirth           |  3 |  5  |  0 |

# Results

Count of articles with the most common outcomes, by BMI

Short-term

|    | Outcome              | Prepregnancy BMI |        |               |
|----|----------------------|------------------|--------|---------------|
|    |                      | Underwt          | Overwt | Obesity (all) |
| 1  | Cesarean deliv       | 17               | 28     | 23            |
| 2  | LGA birth            | 17               | 27     | 20            |
| 3  | SGA birth            | 17               | 23     | 16            |
| 4  | Birthweight          | 20               | 18     | 10            |
| 5  | Preterm birth        | 16               | 20     | 11            |
| 6  | Gest Diabetes        | 11               | 19     | 12            |
| 7  | Preeclampsia         | 5                | 12     | 10            |
| 8  | Macrosomia           | 4                | 11     | 10            |
| 9  | Gestational HTN      | 5                | 10     | 8             |
| 10 | NICU admission       | 5                | 9      | 8             |
| 11 | PPWR 0-11 mo         | 6                | 9      | 7             |
| 12 | Infant death         | 5                | 7      | 6             |
| 13 | Child obesity 4-8 yr | 4                | 10     | 4             |
| 14 | Child obesity 1-3 yr | 4                | 9      | 5             |
| 15 | PPWR 12+ mo          | 5                | 7      | 5             |
| 16 | Stillbirth           | 3                | 5      | 0             |

# Results

Count of articles with the most common outcomes, by BMI

|    | Outcome              | Prepregnancy BMI |        |               |
|----|----------------------|------------------|--------|---------------|
|    |                      | Underwt          | Overwt | Obesity (all) |
| 1  | Cesarean deliv       | 17               | 28     | 23            |
| 2  | LGA birth            | 17               | 27     | 20            |
| 3  | SGA birth            | 17               | 23     | 16            |
| 4  | Birthweight          | 20               | 18     | 10            |
| 5  | Preterm birth        | 16               | 20     | 11            |
| 6  | Gest Diabetes        | 11               | 19     | 12            |
| 7  | Preeclampsia         | 5                | 12     | 10            |
| 8  | Macrosomia           | 4                | 11     | 10            |
| 9  | Gestational HTN      | 5                | 10     | 8             |
| 10 | NICU admission       | 5                | 9      | 8             |
| 11 | PPWR 0-11 mo         | 6                | 9      | 7             |
| 12 | Infant death         | 5                | 7      | 6             |
| 13 | Child obesity 4-8 yr | 4                | 10     | 4             |
| 14 | Child obesity 1-3 yr | 4                | 9      | 5             |
| 15 | PPWR 12+ mo          | 5                | 7      | 5             |
| 16 | Stillbirth           | 3                | 5      | 0             |

Long-term

# Results

Count of articles with the most common outcomes, by **class of obesity**

|    | Outcome              | Prepregnancy BMI |            |            |            |
|----|----------------------|------------------|------------|------------|------------|
|    |                      | Obesity (all)    | Ob class 1 | Ob class 2 | Ob class 3 |
| 1  | Cesarean deliv       | 23               | 10         | 10         | 9          |
| 2  | LGA birth            | 20               | 12         | 10         | 10         |
| 3  | SGA birth            | 16               | 12         | 10         | 10         |
| 4  | Birthweight          | 10               | 4          | 4          | 4          |
| 5  | Preterm birth        | 11               | 9          | 9          | 9          |
| 6  | Gest Diabetes        | 12               | 7          | 6          | 6          |
| 7  | Preeclampsia         | 10               | 7          | 6          | 6          |
| 8  | Macrosomia           | 10               | 5          | 2          | 2          |
| 9  | Gestational HTN      | 8                | 5          | 5          | 5          |
| 10 | NICU admission       | 8                | 5          | 4          | 4          |
| 11 | PPWR 0-11 mo         | 7                | 2          | 2          | 2          |
| 12 | Infant death         | 6                | 4          | 4          | 4          |
| 13 | Child obesity 4-8 yr | 4                | 0          | 0          | 0          |
| 14 | Child obesity 1-3 yr | 5                | 1          | 1          | 1          |
| 15 | PPWR 12+ mo          | 5                | 2          | 2          | 2          |
| 16 | Stillbirth           | 0                | 6          | 6          | 6          |

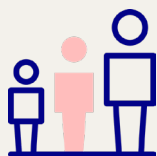


## Conclusions of this Scoping Review

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Large body of data on weight gain and **short-term outcomes**.



Studies on **long-term outcomes** have increased, but more work is needed, including on the range of outcomes.



Research on outcomes by **class of obesity** is smaller, but growing.



More research is needed that studies **short- and long-term outcomes** and **maternal and child outcomes in the same cohort**.

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