Conventional wisdom from AI Internet search for a simple formula to estimate the weight of a reinforced concrete building in metric tons, given the building footprint in square meters and the number of floors.

The total estimated weight of the building (in metric tons) can be calculated as: ***W total =A×N×C***

Where:

- **Wtotal** = Total estimated weight of the building (in metric tons)
- **A** = Building footprint (in m^2)
- **N** = Number of floors
- **C** = A combined average weight factor (in metric tons/m^2/floor)

Explanation of the Combined Average Weight Factor (C):
This factor represents the average weight per square meter per floor, encompassing:

- **Structural Dead Load**: The weight of the reinforced concrete elements themselves (slabs, beams, columns, shear walls). This typically ranges from 1000 kg/m^2 to 1500 kg/m^2 (1.0 to 1.5 metric tons/m^2) per floor.
- **Superimposed Dead Load**: The weight of non-structural elements like floor finishes, ceilings, partitions, and MEP (mechanical, electrical, plumbing) systems. This can be around 250 kg/m^2 to 500 kg/m^2 (0.25 to 0.5 metric tons/ m^2) per floor.
- **Live Load**: The weight of occupants, furniture, and movable equipment. This varies significantly by building use but for typical residential or office buildings, it's often 200 kg/m^2 to 500 kg/m^2 (0.2 to 0.5 metric tons/ m^2) per floor.

For a general estimate, we can use an average combined factor. Let's sum up typical middle-ground values:

- **Structural Dead Load**: ≈1250 kg/ m^2 =1.25 metric tons/m^2
- **Superimposed Dead Load**: ≈350 kg/m 2 =0.35 metric tons/m^2
- **Live Load**: ≈300 kg/m 2 =0.30 metric tons/m^2

Total Average Weight Factor (C): C=1.25+0.35+0.30=1.90 metric tons/m^2/floor

So, the simplified formula becomes: W total =A×N×1.90

Important Notes for this Estimation:

- Preliminary Estimate: This is a very generalized estimate suitable for early-stage planning and conceptualization.
- Varying Factors: The factor 'C' can vary based on the specific type of building (e.g., a warehouse will have higher live loads than an apartment building), the structural system's efficiency, and the density of interior fit-out.
- Foundations Excluded: This formula does not include the weight of the building's foundations, which can be significant.
- Precision: For detailed design and accurate weight calculations, a structural engineer is required to perform a thorough analysis considering specific design loads, material properties, and structural geometry.

Sources:
https://www.structuralbasics.com/dead-load/
https://gdiengdesign.com/designing-for-strength-understanding-load-bearing-capacity-in-structural-engineering/