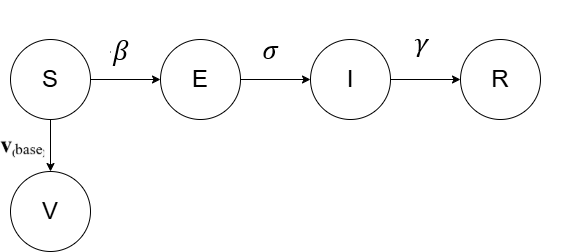
**Compartments and Variables**

Defining compartments and dynamic variables in our model:

* S(t): Number of **Susceptible** individuals at time t.
* E(t)): Number of **Exposed** individuals (infected but not yet infectious) at time t.
* I(t): Number of **Infectious** individuals at time t.
* R(t): Number of **Recovered** individuals at time t.
* V(t): Number of **Vaccinated** individuals at time t.
* y(t): **Willingness to vaccinate**, a dynamic variable in the range [0,1] at time t.

**Parameters**

* **β**: Transmission rate
* **σ**: Rate of progression from exposed to infected
* **γ**: Recovery rate
* **κ**: Social learning rate (influences speed of behavior change)
* **v₍**base**₎**:Baseline vaccination rate
* **N**: Total population



**1. Susceptible Individuals**

Sₜ₊₁ = Sₜ − β × (Sₜ × Iₜ) / N − v\_base × yₜ × Sₜ

**2. Exposed Individuals**

Eₜ₊₁ = Eₜ + β × (Sₜ × Iₜ) / N − σ × Eₜ

**3. Infectious Individuals**

Iₜ₊₁ = Iₜ + σ × Eₜ − γ × Iₜ

**4. Recovered Individuals**

Rₜ₊₁ = Rₜ + γ × Iₜ

**5. Vaccinated Individuals**

Vₜ₊₁ = Vₜ + v\_base × yₜ × Sₜ

Converting the above equations into Differential Equations (Epidemic):

Now, **willingness to vaccinate**, y(t) ∈ [0,1], is influenced by:

* Real-time infection (awareness)
* Misinformation (doubt/fear)
* Campaigns (trust or encouragement)
* False beliefs (cognitive/social resistance)

Let us define Score(t) — the behavioral influence driver