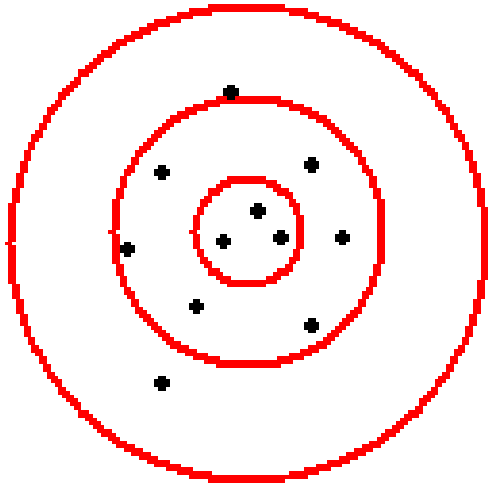


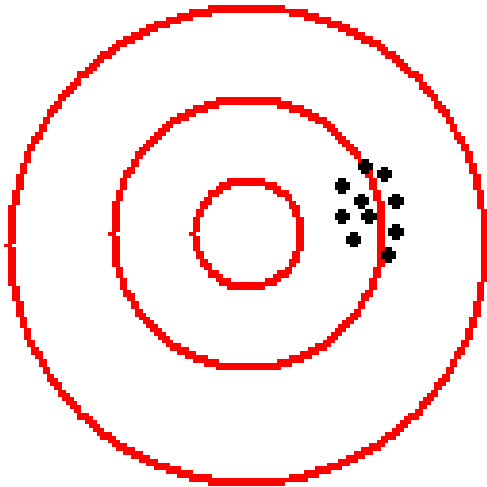
Role of valid and reliable data on road traffic injuries

Alfredo Celis





Random error



Systematic error: bias



Properties desirable in any measurement

- ★ Validity: A good measurement method should yield the correct value.
- ★ Reliability: A good measurement should yield the same value if applied repeatedly under circumstances in which the underlying characteristic is believed to remain the same (but, being consistent is not good enough if the results are consistently wrong)



Valid measurement for qualitative variables

Classification criteria	Characteristic of interest (gold standard)	
	Yes	No
Yes	a	b
No	c	d

★ Sensitivity:
 $(a/a+c)100$

★ Especificity:
 $(d/b+d)100$



Valid measurement for qualitative variables

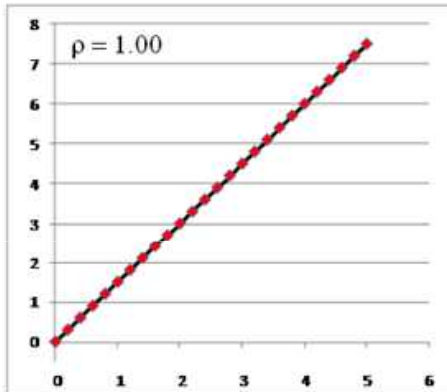
Classification criteria	Characteristic of interest (gold standard)	
	Yes	No
Yes	90	20
No	10	80

★ Sensitivity:
 $(90/100)100 = 90\%$

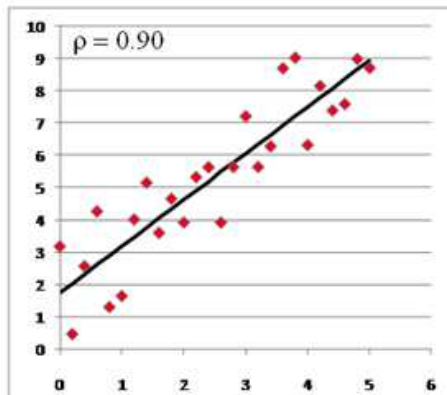
★ Especificity:
 $(80/100)100 = 80\%$



Valid measurement for quantitative variables



$$\begin{aligned}\rho_{TX} &= 1 \\ \beta_0 &= 0 \\ \beta_1 &= 1\end{aligned}$$



Reliable measurement for qualitative variables

First measurement	Second measurement	
	Yes	No
Yes	a	b
No	c	d

$$\text{acuerdo observado} = \frac{a + d}{a + b + c + d}$$

$$\text{acuerdo esperado} = \frac{(a + b)(a + c) + (c + d)(b + d)}{(a + b + c + d)^2}$$

$$\text{Kappa} = \frac{\text{acuerdo observado} - \text{acuerdo esperado}}{1 - \text{acuerdo esperado}}$$

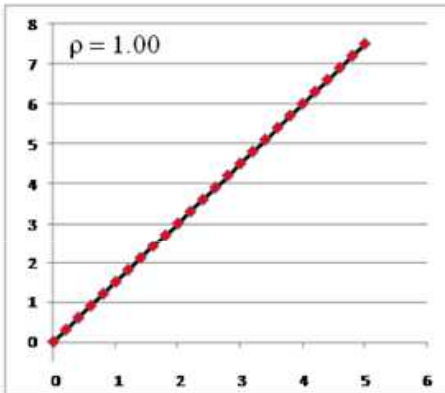


Guidelines for interpreting Kappa

Kappa	Interpretation
> 0.80	Almos perfect
0.61 – 0.80	Substantial
0.41 – 0.60	Moderate
0.21 – 0.40	Fair
0.00 – 0.20	Slight
> 0.00	Poor



Reliable measurement for quantitative variables



$$\rho_{X_1X_2} < \rho_{TX_1} < \sqrt{\rho_{X_1X_2}}$$

