

Biostatistics 3: Bivariate Analysis (Parametric-Non Parametric)

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Parametric Statistics

Comparison test: t-test, ANOVA
Correlation test: Pearson product moment
Test of influence: Regression

Nonparametric Statistics

Comparison test: Wilcoxon, Mann Whitney,
Test marks, Kruskal Wallis,
Friedman Anova, Chi Square,
Exact Fischer, McNemar
Correlation test: Spearman, Koef. Phi,
Koef. Contingency,
Koef. Cramer's V
Test of influence: Logistic Regression,
Ordinal Regression

RATIO

Number of visits
Number of beds
Weight
Height

INTERVAL

Temperature
Lens size

ORDINAL

Rank 1 = 1
Rank 2 = 2
Rank 3 = 3

NOMINAL

Male = 1
Female = 2

Arithmetic operations can be performed

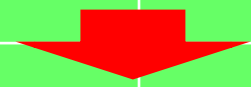
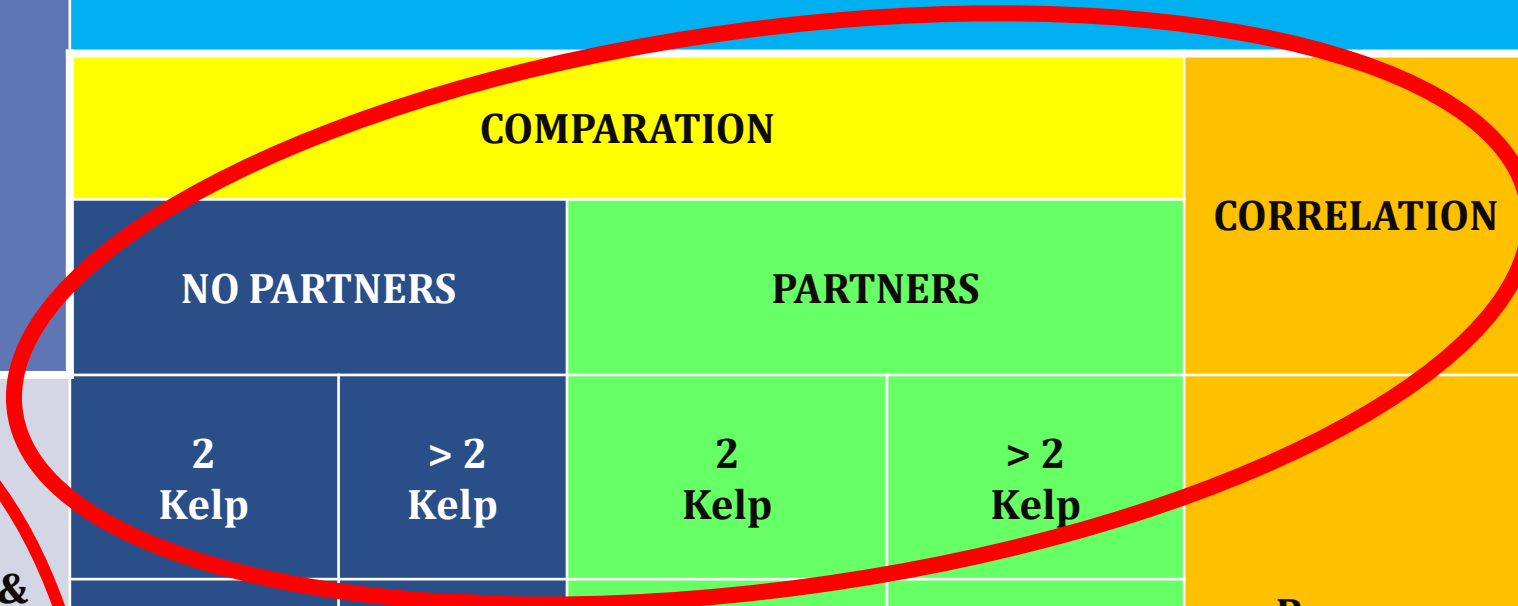
(x) (:) (+) (-)

Data Type/Scale

Arithmetic operations cannot be performed

(x) (:) (+) (-)

MEASUREMENT SCALE	HYPOTHESIS (ASSOCIATION)				CORRELATION
	COMPARATION				
	NO PARTNERS		PARTNERS		
NUMERIK (RASIO & INTERVAL)	2 Kelp	> 2 Kelp	2 Kelp	> 2 Kelp	Pearson
	T-test Unpaired	One Way ANOVA	T-test Paired	Repeated ANOVA	
KATEGORIK (ORDINAL)	Mann Whitney	Kruskal-Wallis	Wilcoxon	Friedman	Spearman, Sommers 'd, Gamma
KATEGORIK	Chi Square Fisher Kolmogorov- Smirnov (Table B x K)		McNemar, Cochran, Marginal Homogeneity, Wilcoxon, Friedman (Principle P x K)		Coeffisien kontingensi, LAMBDA



Distribution Data

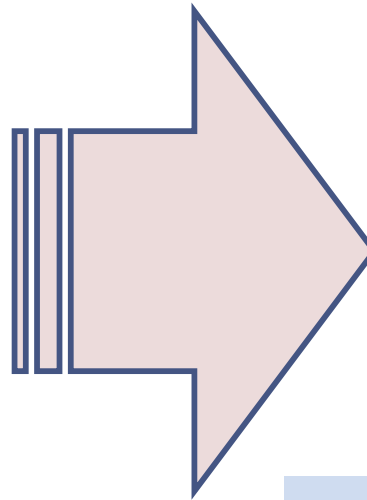
METHOD	PARAMETER	CRITERIA	NOTE
DESKRIPTIF	Koefisien Varian	Nilai Koef. > 30%	$\frac{SD}{mean} \times 100\%$
	Rasio Skewness	Nilai rasio -2 s/d 2	$\frac{Skewness}{SE\ Skewness}$
	Rasio Kurtosis	Nilai rasio -2 s/d 2	$\frac{Kurtosis}{SE\ Kurtosis}$
	Histogram	Simetri kanan kiri, tinggi ideal	
	Box Plot	Median tepat ditengah tidak ada ourlier atau nilai ekstrim	
	Normal Q-Q plots	Data menyebar sekitar garis	
	Detrended Q-Q plots	Data menyebar sekitar garis pada nilai 0	
	ANALITIK	Kolmogorov-Smirnov	$P > 0.05$
Shapiro-Wilk		$P > 0,05$	Sampel ≤ 50

ONE WAY ANOVA

- **NORMALITY DATA**
- **SAME DATA VARIANTS/HOMOGENITY**



**VARIANTS DATA Test →
Levene Test**



**Transformation
Fail**



**KRUSKAL-
WALLIS**



**Post
Hoc**

UJI TIDAK BERPASANGAN VARIABEL KATEGORIKAL (TABEL 2x2 & 2xK)

CHI SQUARE

TABEL 2X2/2X3, TIDAK ADA SEL YG MEMPUNYAI
NILAI EXPECTED KURANG DARI 5

**SYARAT TDK
DIPENUHI**

PADA TABEL 2X2,
ADA SEL YANG
NILAI EXPECTED
KURANG DARI 5

FISHER

**SYARAT TDK
DIPENUHI**

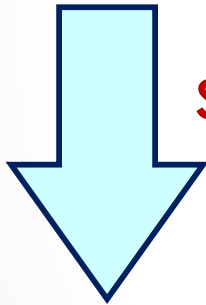
PADA TABEL 2X3,
ADA SEL YANG
NILAI EXPECTED
KURANG DARI 5

KOLMOGOROV SMIRNOV

UJI TIDAK BERPASANGAN VARIABEL KATEGORIKAL (**selain** TABEL 2x2 & 2xK)

UJI CHI SQUARE

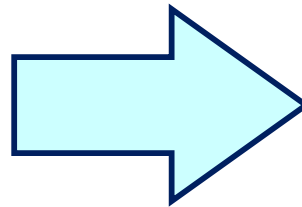
TIDAK ADA SEL YG MEMPUNYAI NILAI EXPECTED
KURANG DARI 5



SYARAT TDK DIPENUHI

ADA SEL YANG NILAI
EXPECTED KURANG DARI 5




Penggabungan Sel →
2xK



Chi Square

UJI BERPASANGAN VARIABEL KATEGORIKAL (PRINSIP P x K)

Uji yang digunakan

- $P \times K = 2 \times 2$  • Mc NEMAR
- $P \times K = 2 \times (>2)$  • MARGINAL
HOMOGENEITY,
WILCOXON
- $P \times K = (>2) \times 2$  • COCHRAN

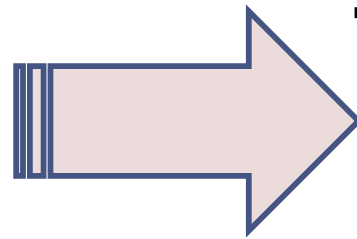
Correlation Hypothesis

Correlative Hypothesis Selection

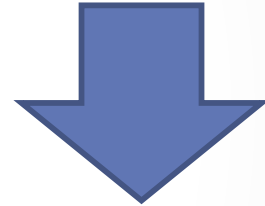
VARIABEL 1	VARIABEL 2	UJI KORELASI
NOMINAL	NOMINAL	KOEF. KONTINGENSI, LAMBDA
NOMINAL	ORDINAL	KOEF. KONTINGENSI, LAMBDA
ORDINAL	ORDINAL	SPEARMAN, GAMMA, SOMMERS'D
ORDINAL	NUMERIK	SPEARMAN
NUMERIK	NUMERIK	PEARSON

PEARSON

- **NORMALITY
DATA**






**Transformation
Fail**



SPEARMAN

CORRELATION TEST ORDINAL - ORDINAL

- SPEARMAN  • TABEL 2X2
- SOMMERS'D  • TABEL 3X3
• DEPENDENT-
INDEPENDENT
- GAMMA  • TABEL 3X3
• IN/DEPENDENT-
IN/DEPENDENT
(SETARA)

CATEGORICAL CORRELATION TEST

KOEFISIEN KONTINGENSI:

- IN/DEPENDENT – IN/DEPENDENT (**SETARA**)

LAMBDA:

- DEPENDENT - INDEPENDENT

Interpretation Of Correlation Test

NO	PARAMETER	NILAI	INTERPRETASI
1	KEKUATAN KORELASI (r)	0.00 – 0,199	SANGAT LEMAH
		0,20 – 0,399	LEMAH
		0,40 – 0,599	SEDANG
		0,60 – 0,799	KUAT
		0,80 – 1,000	SANGAT KUAT
2	NILAI p	$P < 0,05$	KORELASI BERMAKNA ANTARA 2 VARIABEL YANG DI UJI
		$P > 0.05$	TIDAK TERDAPAT KORELASI TIDAK BERMAKNA ANTARA VARIABEL YANG DIUJI
3	ARAH KORELASI	+ (POSITIF)	SEARAH, SEMAKIN BESAR NILAI SATU VARIABEL → SEMAKIN BESAR NILAI VARIABEL LAINNYA
		- (NEGATIF)	BERLAWANAN ARAH, SEMAKIN BESAR NILAI SATU VARIABEL → SEMAKIN KECIL NILAI VARIABEL LAINNYA

Research Method

Not Difficult But Not Easy

**Never Stop When The Process Was
Running**

**Thank you
for your attention**