Using Graphical methods to elucidate the Information contained in Multi-variate data

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Graphical Methods – Histograms of Nappi Codes Rank Counts

- Marginal distributions of the Counts of Prescriptions according Nappi-codes (antibiotics) were studied

- Marginal distributions of the Counts of Prescriptions according ICD codes were also investigated

- Repeat Prescriptions to individuals was not identified, for this talk, for the same Antibiotics or Other Antibiotics

- The tables of 'Nappi-codes' by 'ICD codes' usually contains more than 90% Zero counts

- In this lecture hardly any attention was given to the different formulations

Is there any structure in the Prescribing of Medication?
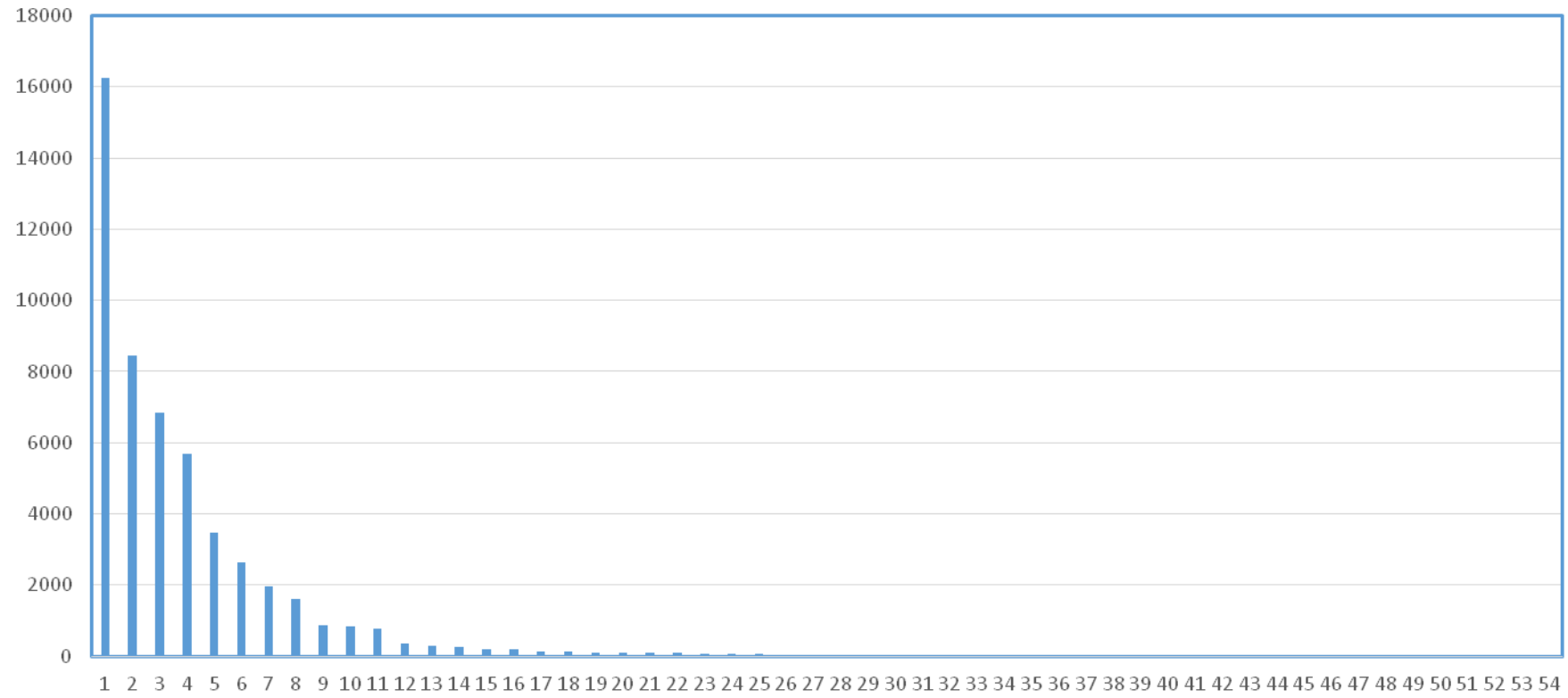
Pharmaceutical Background

- In only 8.3% of prescriptions ICD codes were not supplied

- Covering the Complete South Africa

- The prescriptions were dispensed by an Extensive Pharmaceutical group

- Concentrating on Amoxicillin combined with clavulanic acid (co-amoxiclav)

Related Mathematical & Statistical Terminology

- **Pareto distribution**

- **Zipf's law**

- **"80-20 law",**

according to which 20% of all people receive 80% of all income,
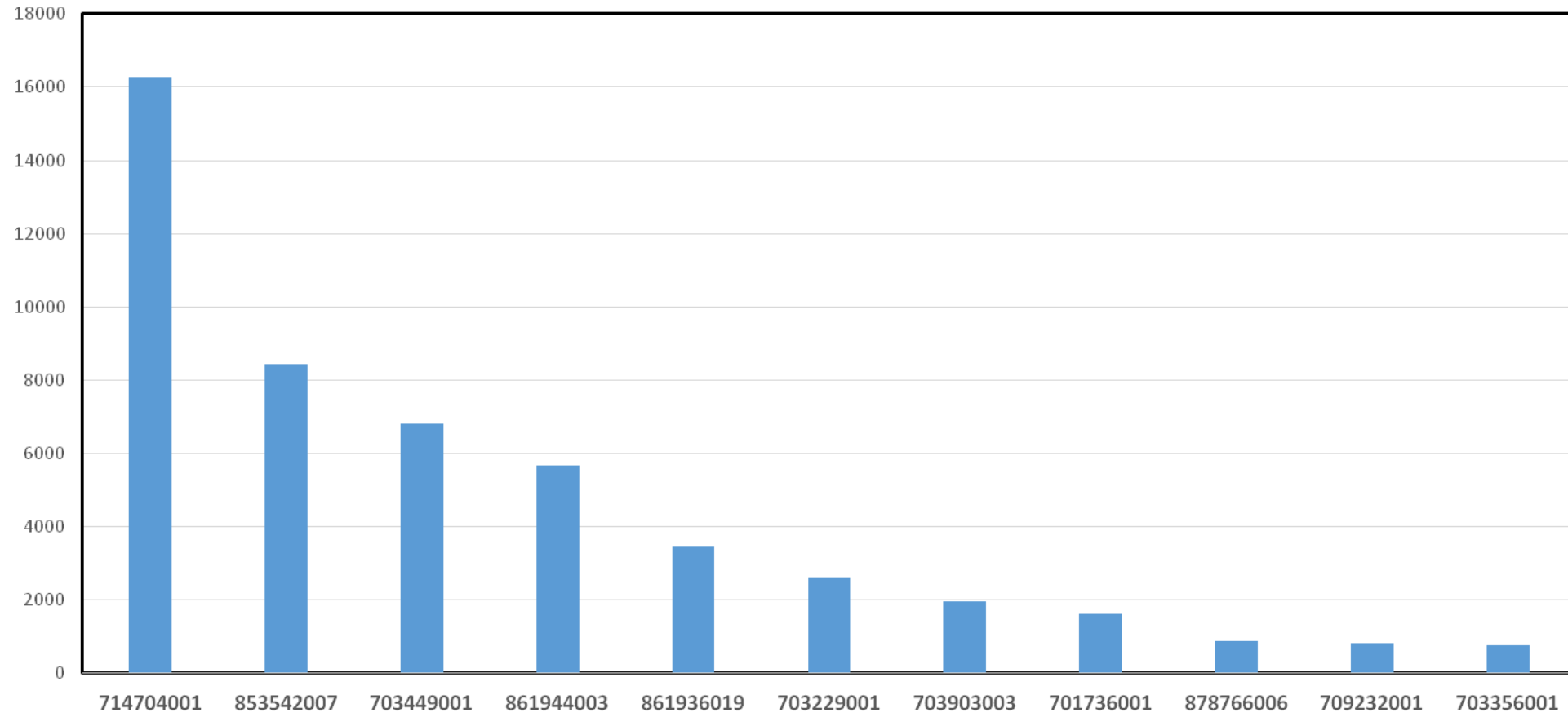and 20% of the most affluent 20% receive 80% of that 80%, and so on,

First example

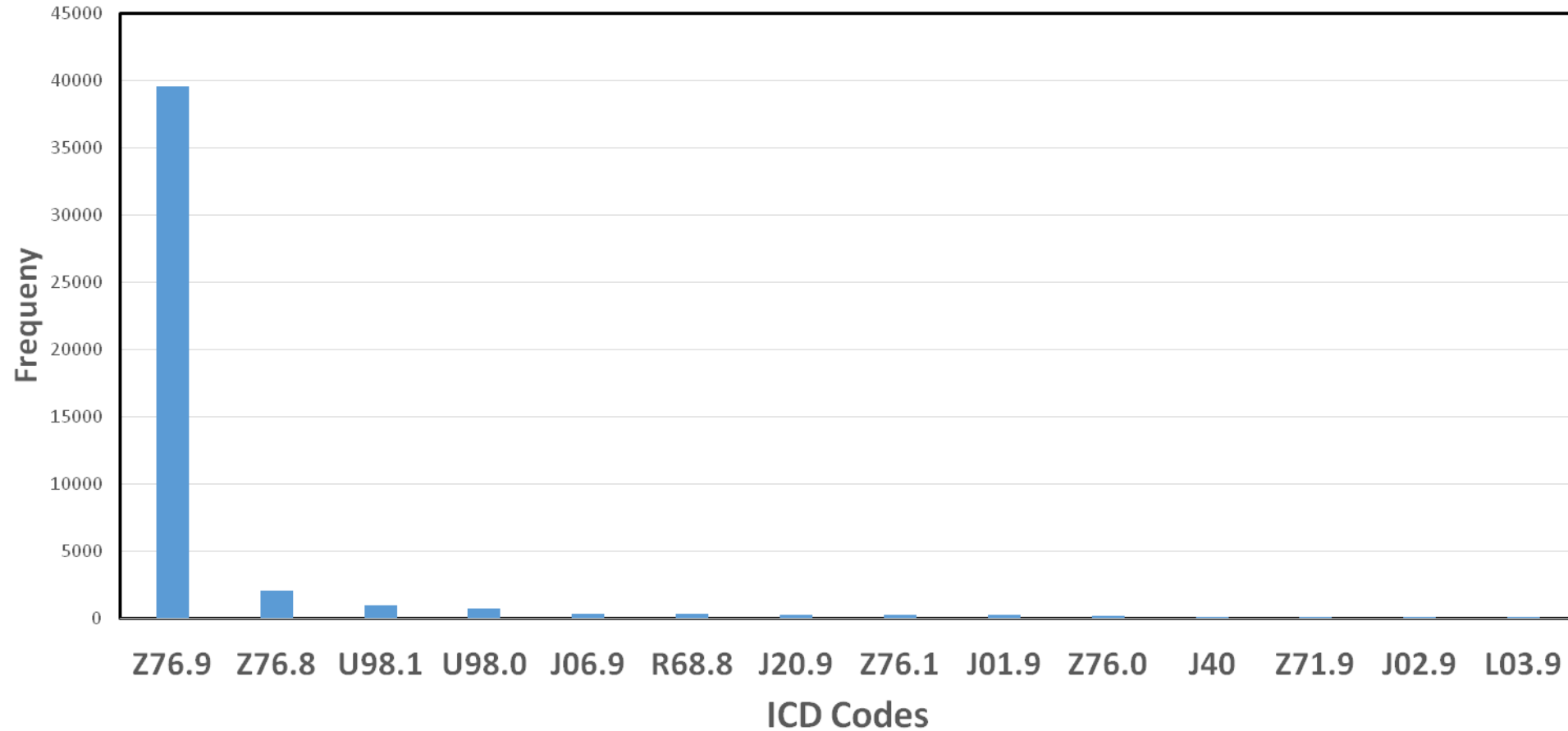## Ranked Frequencies of all Nappi CODEs

First example:- Enlarged and Nappi Codes Specified

Frequency of very common Nappi CODEs

Second marginal (Margin – 'on the edge') example: ICD Codes

Ranked according Frequency

Official Listing - ICD	Estimated # All ICD Codes Official List	Number of ICD Codes Study Info	Alpha Numeric Code: Alpha; First Digit and Second Digit	#Cells #Cells	% Zeros % Zeros
Certain infectious and parasitic diseases	1056	8	AaA	432	95.1%
		5	BbB	270	96.7%
Neoplasms	1620	36	C00 - D49	1944	97.6%
Diseases of the blood and blood forming organs and certain disorders involving the immune system	238		D50 - D89		
Endocrine, nutritional and metabolic disease	675	7	EeE	378	96.3%
Mental and behavioural disorders	724	9	FfF	486	97.7%
Diseases of the nervous system	2452	4	GhG	216	97.7%
Diseases of the eye and adnexa	642	30	H00-H59	1620	96.2%
Diseases of the mastiod process			H60-H95		
Diseases of the circulatory System	1254	16	IiI	864	96.4%
Diseases of the respiratory system	336	72	JjJ	3888	91.6%

Explaining   '% Zeroes or Blanks'

'Zeros or Blanks'   **Cells was Blank because none of the studied antibiotics was prescribed for that particular ICD condition**

Reasons for this is →   **Only short list of Antibiotics known or trusted by the Prescriber**

likely to be:

→   **Some of the Antibiotics (Nappi codes) were not available from the Supplier (only equivalents)**

Official Listing - ICD	Estimated # All ICD Codes Official List	Number of ICD Codes Study Info	Alpha Numeric Code: Alpha; First Digit and Second Digit	#Cells #Cells	% Zeros % Zeros
Diseases of the subcutaneous tissue	769	35	LlL	1890	94.3%
Diseases of the musculoskeletal system and connective tissue	6339	27	MmM	1458	98.0%
Diseases of the genitourinary system	593	33	NnN	1782	96.0%
Pregnancy, childbirth and puerperium	639	0	OoO	0	–
Certain conditions of the perinatal period	714	0	PpP	0	–
Congenital malformations, deformities and chromsomal abnormalities	790	0	QqQ	0	–
Symptoms, signs and abnormal clinical and laboratory findings , not elsewhere classified	639	12	RrR	648	91.8%
Injury, poisoning and certain other consequences of external causes	39869	14	S00 - T88	756	97.50%
External causes of morbidity and mortality	6812	2	V00 - Y99	108	57.4%
Factors influencing health status and contact with health services	1178	34	ZzZ	1836	86.8%

What could be learned from the Pareto distribution, Disease classification (ICD) and from Nappi Codes

- Extreme clustering – maybe due brand promotion

- Linking disease to Treatment

- "Do no harm" – Age old principle Medical Ethics

    Long term negative effect of using Antibiotics
    Prescribing Antibiotics for the Wrong Reasons
    ≋ ≋ To please the Patient (Customer)