



**Количественные и качественные
методы в исследовании развития**

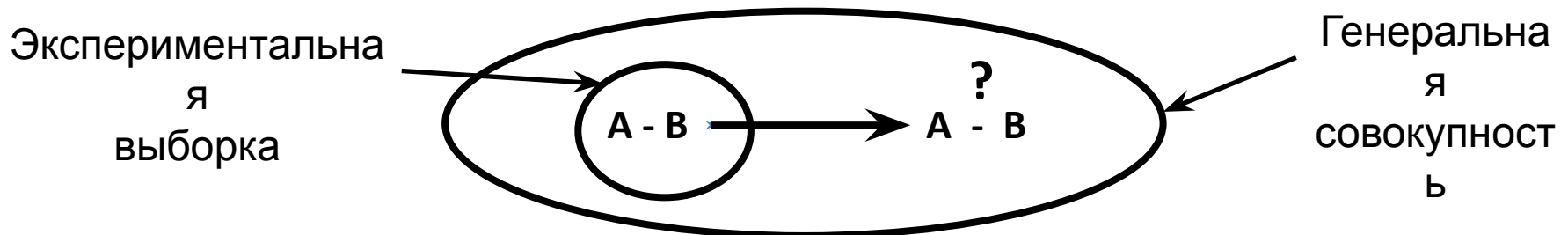
Раздел 2: Общие принципы статистического анализа данных



Раздел 2: Общие принципы статистического анализа данных

Основные понятия статистического анализа данных:

1. **Величина** зависимости - количественное выражение зависимости;
2. **Значимость** зависимости (p), которая определяет, насколько можно доверять полученному результату.



Результат считается значимым, если вероятность ошибки не превышает 5% ($p < 0,05$)

Раздел 2: Общие принципы статистического анализа данных

Тип шкалы измерения:

1. Номинальная шкала (*nominal*);
2. Порядковая (ранговая) шкала (*ordinal*);
3. Шкала интервалов (*interval*);
4. Шкала отношений (*ratio, scale*).



Раздел 2: Общие принципы статистического анализа данных

Тип шкалы измерения:

A – 1

B – 2

C – 3

D – 4



Раздел 2: Общие принципы статистического анализа данных

Мода, медиана, среднее и дисперсия:

№	Пол	Возраст начала курения	№	Пол	Возраст начала курения	№	Пол	Возраст начала курения
1	М	11	13	Ж	12	25	Ж	13
2	М	8	14	Ж	10	26	Ж	11
3	М	12	15	Ж	12	27	М	13
4	М	6	16	М	12	28	М	7
5	Ж	13	17	Ж	14	29	М	10
6	М	12	18	М	7	30	Ж	6
7	Ж	11	19	М	10	31	М	12
8	Ж	10	20	М	14	32	М	11
9	М	12	21	М	10	33	М	13
10	М	15	22	М	8	34	Ж	12
11	Ж	12	23	Ж	11	35	М	10
12	М	9	24	М	12			

Раздел 2: Общие принципы статистического анализа данных

Мода:

Возраст начала курения	Частота
6	2
7	2
8	2
9	1
10	6
11	5
12	10
13	4
14	2
15	1
Всего	35

Среднее: 10,89



Раздел 2: Общие принципы статистического анализа данных

Медиана:

Возраст начала курения	Частота	Накопленная частота	%
6	2	2	5,7
7	2	4	11,4
8	2	6	17,1
9	1	7	20,0
10	6	13	37,1
11	5	18	51,4
12	10	28	80,0
13	4	32	91,4
14	2	34	97,1
15	1	35	100,0
Всего	35		

Раздел 2: Общие принципы статистического анализа данных

Дисперсия: Частота * (Возраст – Среднее)² / (число значений - 1)

Возраст начала курения	Частота	(Возраст – Среднее)	(Возраст – Среднее) ²	Частота *(Возраст – Среднее) ²
6	2	-4,89	23,91	47,82
7	2	-3,89	15,13	30,26
8	2	-2,89	8,35	16,70
9	1	-1,89	3,57	3,57
10	6	-0,89	0,79	4,74
11	5	0,11	0,01	0,05
12	10	1,11	1,23	12,30
13	4	2,11	4,45	17,80
14	2	3,11	9,67	19,34
15	1	4,11	16,89	16,89
Всего	35			∑ = 169,47 (4,98)

Раздел 2: Общие принципы статистического анализа данных

Внесение данных:

The screenshot shows the PASW Statistics Data Editor interface in Variable View. The main window displays a table with 12 columns and 20 rows. The first row is defined with the following properties:

	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Role
1	number	Numeric	8	0		None	None	8	Center	Nominal	Input
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

The interface includes a menu bar (File, Edit, View, Data, Transform, Analyze, Direct Marketing, Graphs, Utilities, Add-ons, Window, Help) and a toolbar with various icons. The status bar at the bottom indicates "PASW Statistics Processor is ready" and shows the time as 2:49.

Раздел 2: Общие принципы статистического анализа данных

Внесение данных:

The screenshot displays the PASW Statistics Data Editor interface. The main window shows a list of variables with the following columns: Name, Type, Width, Decimals, Label, Values, Missing, Columns, Align, Measure, and Role. The 'gender' variable is selected, and its 'Values' column contains 'None'. A 'Value Labels' dialog box is open, showing the 'Value' field set to '2' and the 'Label' field set to 'woman'. The dialog also includes an 'Add' button, a 'Change' button, a 'Remove' button, and a list of existing labels containing '1 = "man"'. The 'OK', 'Cancel', and 'Help' buttons are at the bottom of the dialog.

	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Role
1	number	Numeric	8	0		None	None	8	Center	Nominal	Input
2	gender	Numeric	8	0		None	None	8	Right	Nominal	Input
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											

Value Labels dialog box:

Value Labels

Value: 2

Label: woman

1 = "man"

Buttons: Add, Change, Remove, Spelling..., OK, Cancel, Help

Раздел 2: Общие принципы статистического анализа данных

Внесение данных:

The screenshot shows the PASW Statistics Data Editor interface in Variable View. The main table contains the following data:

	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Role
1	number	Numeric	8	0		None	None	8	Center	Nominal	Input
2	gender	Numeric	8	0		{1, man}...	None	8	Center	Nominal	Input
3	age	Numeric	8	0		None	None	8	Center	Scale	Input
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											

The interface includes a menu bar (File, Edit, View, Data, Transform, Analyze, Direct Marketing, Graphs, Utilities, Add-ons, Window, Help) and a toolbar with various icons. The status bar at the bottom shows 'PASW Statistics Processor is ready' and the system clock '3:07'.

Раздел 2: Общие принципы статистического анализа данных

Внесение данных:

The screenshot shows the PASW Statistics Data Editor interface. The main window displays a data table with 18 rows and 19 columns. The first three columns are labeled 'number', 'gender', and 'age'. The remaining 16 columns are labeled 'var'. The data is as follows:

	number	gender	age	var	var	var	var	var	var	var	var	var	var	var	var	var	var	var
1	1	man	11															
2	2	man	8															
3	3	man	12															
4	4	man	6															
5	5	woman	13															
6	6	man	12															
7	7	woman	11															
8	8	woman	10															
9	9	man	12															
10	10	man	15															
11	11	woman	12															
12	12	man	9															
13	13	woman	12															
14	14	woman	10															
15	15	woman	12															
16	16	man	12															
17	17	woman	14															
18	18	man	7															

The interface includes a menu bar (File, Edit, View, Data, Transform, Analyze, Direct Marketing, Graphs, Utilities, Add-ons, Window, Help) and a toolbar with various icons. The status bar at the bottom indicates 'PASW Statistics Processor is ready' and the system clock shows 'EN 3:25'.

Раздел 2: Общие принципы статистического анализа данных

Описание данных:

The screenshot shows the PASW Statistics Data Editor interface. The main window displays a data table with 18 rows and 4 columns. The first two columns are labeled 'number' and contain values from 1 to 18. The third and fourth columns contain categorical data: 'woman' and 'man' for rows 13-18, and empty cells for rows 1-12. The 'Analyze' menu is open, showing various statistical options. The 'Frequencies...' option is selected, and a sub-menu is visible with options like 'Descriptives...', 'Explore...', 'Crosstabs...', 'Ratio...', 'P-P Plots...', and 'Q-Q Plots...'. The status bar at the bottom indicates 'PASW Statistics Processor is ready' and the time is 3:32.

	number		
1	1		
2	2		
3	3		
4	4		
5	5		
6	6		
7	7		
8	8		
9	9		
10	10		
11	11		
12	12		
13	13	woman	12
14	14	woman	10
15	15	woman	12
16	16	man	12
17	17	woman	14
18	18	man	7

Раздел 2: Общие принципы статистического анализа данных

Описание данных:

The screenshot displays the PASW Statistics Data Editor interface. The main window shows a data table with 18 rows and 4 columns: 'number', 'gender', 'age', and 'var'. The data is as follows:

	number	gender	age
1	1	man	11
2	2	man	8
3	3	man	12
4	4	man	6
5	5	woman	13
6	6	man	12
7	7	woman	11
8	8	woman	10
9	9	man	12
10	10	man	15
11	11	woman	12
12	12	man	9
13	13	woman	12
14	14	woman	10
15	15	woman	12
16	16	man	12
17	17	woman	14
18	18	man	7

Two dialog boxes are open over the data table:

- Frequencies**: This dialog box is used to select variables for analysis. The 'number' and 'gender' variables are listed in the left pane, and the 'age' variable is selected in the 'Variable(s):' list on the right. The 'Display frequency tables' checkbox is checked. Buttons for 'Statistics...', 'Charts...', 'Format...', and 'Bootstrap...' are visible.
- Frequencies: Statistics**: This dialog box allows for the selection of specific statistical measures. Under 'Percentile Values', 'Quartiles' is selected. Under 'Central Tendency', 'Mean', 'Median', and 'Mode' are selected. Under 'Dispersion', 'Std. deviation', 'Variance', and 'Range' are selected. The 'Values are group midpoints' checkbox is unchecked. Buttons for 'Continue', 'Cancel', and 'Help' are at the bottom.

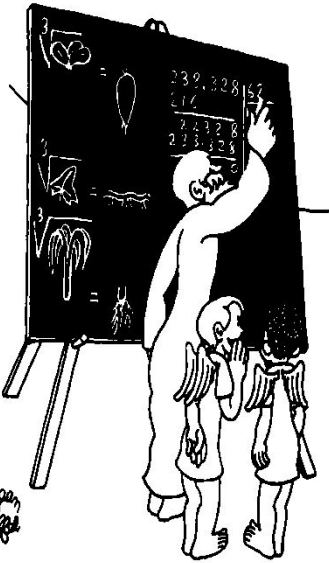
The bottom of the window shows the 'Data View' tab selected, and the status bar indicates 'PASW Statistics Processor is ready'.

Раздел 2: Общие принципы статистического анализа данных

Statistics

Описание данных:

age		
N	Valid	35
	Missing	0
Mean		10,89
Median		11,00
Mode		12
Std. Deviation		2,233



		Age			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	6	2	5,7	5,7	5,7
	7	2	5,7	5,7	11,4
	8	2	5,7	5,7	17,1
	9	1	2,9	2,9	20,0
	10	6	17,1	17,1	37,1
	11	5	14,3	14,3	51,4
	12	10	28,6	28,6	80,0
	13	4	11,4	11,4	91,4
	14	2	5,7	5,7	97,1
	15	1	2,9	2,9	100,0
	Total	35	100,0	100,0	

Раздел 2: Общие принципы статистического анализа данных

Графическое представление данных:

The screenshot displays the PASW Statistics Data Editor interface. The main window shows a data table with 18 rows and 4 columns. The first two columns are labeled 'number' and contain values from 1 to 18. The third and fourth columns contain categorical and numerical data, respectively.

	number		
1	1		
2	2		
3	3		
4	4		
5	5		
6	6		
7	7		
8	8		
9	9		
10	10		
11	11		
12	12		
13	13	woman	12
14	14	woman	10
15	15	woman	12
16	16	man	12
17	17	woman	14
18	18	man	7

The 'Analyze' menu is open, showing various statistical options. The 'Frequencies...' option is selected. The 'Data View' tab is active at the bottom left. The status bar at the bottom right indicates 'PASW Statistics Processor is ready' and the system clock shows '3:32'.

Раздел 2: Общие принципы статистического анализа данных

Графическое представление данных:

The screenshot displays the PASW Statistics Data Editor interface. The main window shows a data table with 18 rows and 17 columns. The first three columns are labeled 'number', 'gender', and 'age'. The remaining columns are labeled 'var'. The data is as follows:

	number	gender	age	var	var	var	var	var	var	var	var	var	var	var	var	var
1	1	man														
2	2	man														
3	3	man														
4	4	man														
5	5	woman														
6	6	man														
7	7	woman														
8	8	woman														
9	9	man	12													
10	10	man	15													
11	11	woman	12													
12	12	man	9													
13	13	woman	12													
14	14	woman	10													
15	15	woman	12													
16	16	man	12													
17	17	woman	14													
18	18	man	7													

Two dialog boxes are open over the data table:

- Frequencies**: This dialog box has 'number' and 'age' in the left list and 'gender' in the 'Variable(s):' list on the right. It includes buttons for 'Statistics...', 'Charts...', 'Format...', and 'Bootstrap...'. The 'Display frequency tables' checkbox is unchecked. At the bottom are 'OK', 'Paste', 'Reset', 'Cancel', and 'Help' buttons.
- Frequencies: Charts**: This dialog box shows 'Pie charts' selected under 'Chart Type'. The 'Show normal curve on histogram' checkbox is checked. Under 'Chart Values', 'Frequencies' is selected. It has 'Continue', 'Cancel', and 'Help' buttons.

The bottom of the screen shows the Windows taskbar with the Start button, several application icons, and the system tray displaying 'PASW Statistics Processor is ready', 'EN', and '17:16'.

Раздел 2: Общие принципы статистического анализа данных

Графическое представление данных:

SPSS Statistics Data Editor interface showing a data table, a pie chart, and a Properties dialog box.

	number	gender	age	var	var	var	var	var
1	1							
2	2							
3	3							
4	4							
5	5							
6	6							
7	7							
8	8							
9	9							
10	10							
11	11							
12	12							
13	13							
14	14							
15	15							
16	16							
17	17							
18	18							

Chart Editor: gender

Gender	Percentage
man	63%
woman	37%

Properties Dialog Box: Text Style

Preview in Preferred Size: **AaBbCc 123**

Font Family: SansSerif, Style: Bold, Size: Automatic, Preferred Size: 14, Minimum Size: 6

Color: (0, 0, 0)

Buttons: Apply, Close, Help

Раздел 2: Общие принципы статистического анализа данных

Графическое представление данных:

The screenshot displays the PASW Statistics Data Editor interface. The main window shows a data table with 18 rows and 17 columns. The first four columns are labeled 'number', 'gender', 'age', and 'var'. The data is as follows:

	number	gender	age	var	var	var	var	var	var	var	var	var	var	var	var	var
1	1	man	11													
2	2	man	8													
3	3	man	12													
4	4	man	6													
5	5	woman	13													
6	6	man	12													
7	7	woman	11													
8	8	woman	10													
9	9	man	12													
10	10	man	15													
11	11	woman	12													
12	12	man	9													
13	13	woman	12													
14	14	woman	10													
15	15	woman	12													
16	16	man	12													
17	17	woman	14													
18	18	man	7													

Two dialog boxes are open over the data table:

- Frequencies**: This dialog box is used to select variables for analysis. The 'number' and 'gender' variables are listed on the left, and the 'age' variable is selected in the 'Variable(s):' list on the right. Buttons for 'Statistics...', 'Charts...', 'Format...', and 'Bootstrap...' are visible. The 'Display frequency tables' checkbox is unchecked.
- Frequencies: Charts**: This dialog box allows for selecting a chart type. The 'Histograms' option is selected under 'Chart Type'. The 'Show normal curve on histogram' checkbox is checked. Under 'Chart Values', the 'Frequencies' radio button is selected.

The bottom of the window shows the 'Data View' and 'Variable View' tabs, and the status bar indicates 'PASW Statistics Processor is ready' and the time '17:09'.

Раздел 2: Общие принципы статистического анализа данных

Графическое представление данных:

SPSS Statistics Data Editor window showing a histogram of the 'age' variable. The histogram is displayed in the Chart Editor, and the Properties dialog box is open, showing the Scale tab.

The data table shows the following values for the 'number' variable:

Row	number
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17
18	18

The histogram displays the frequency distribution of the 'age' variable. The x-axis is labeled 'age' and ranges from 6 to 15. The y-axis is labeled 'Frequency' and ranges from 0 to 10. The bars represent the frequency of each age value, with a normal distribution curve overlaid. The mean is 10,89, the standard deviation is 2,233, and the sample size is N = 35.

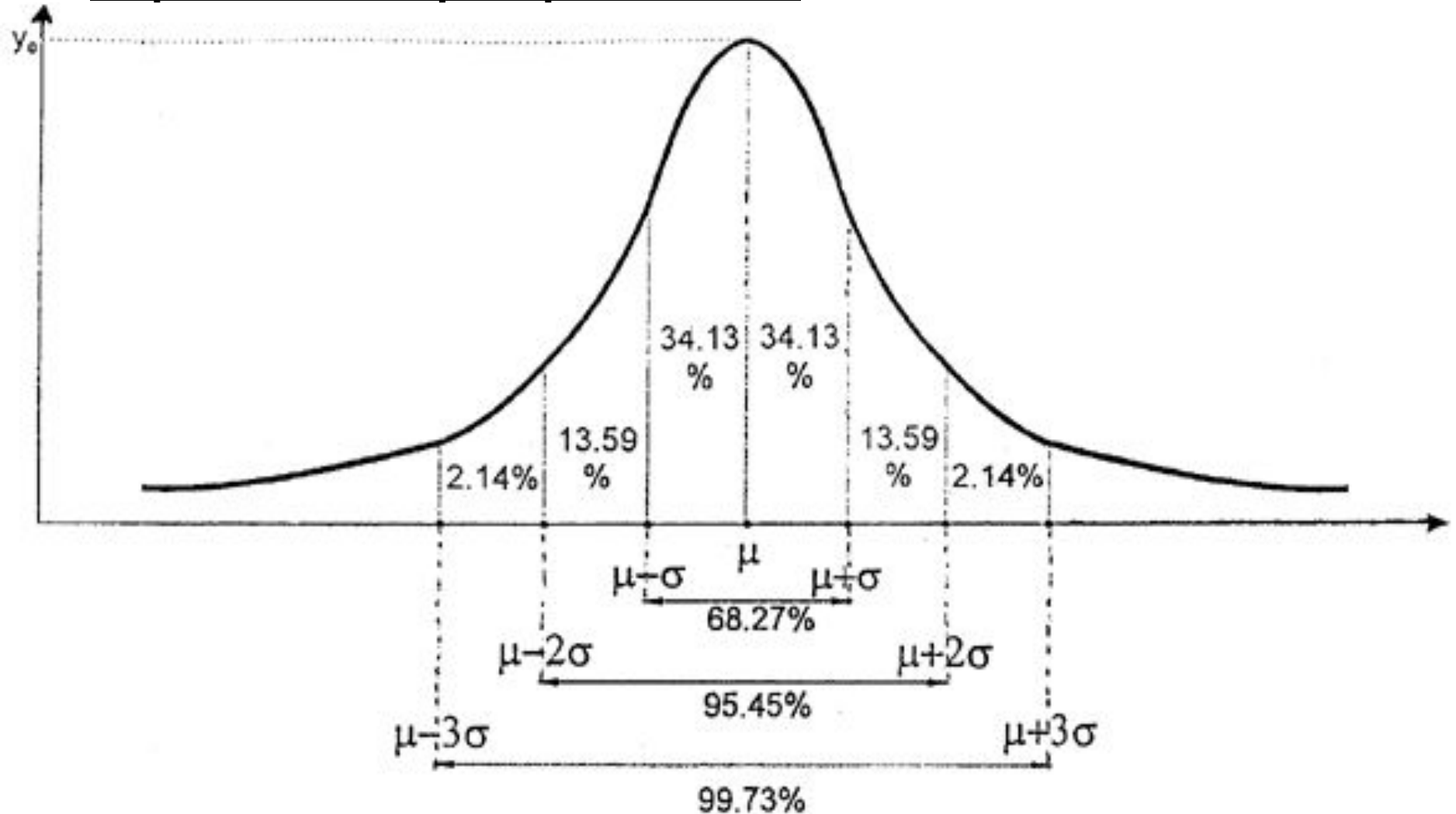
The Properties dialog box (Scale tab) shows the following settings:

- Range: Auto (selected), Custom (6, 16), Display line at origin (unchecked)
- Type: Linear (selected), Logarithmic (Base: 10, Safe), Power (Exponent: 0,5, Safe)
- Lower margin (%): 5, Upper margin (%): 5

SPSS Statistics Processor is ready. EN 17:57

Раздел 2: Общие принципы статистического анализа данных

Нормальность распределения:



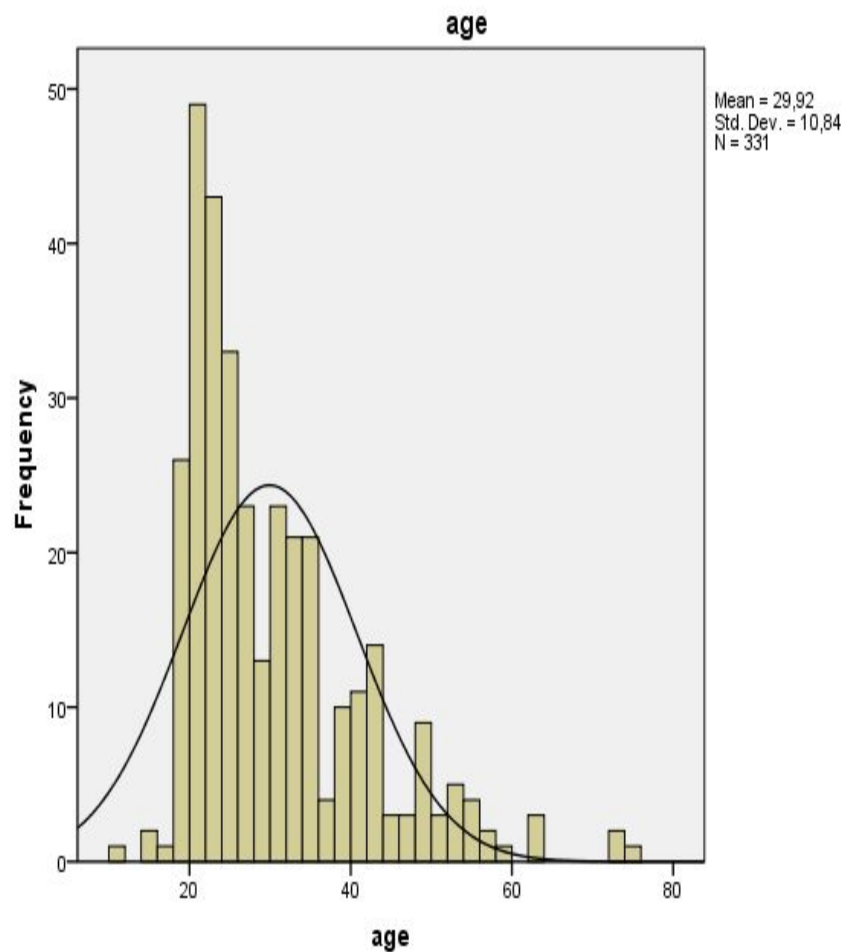
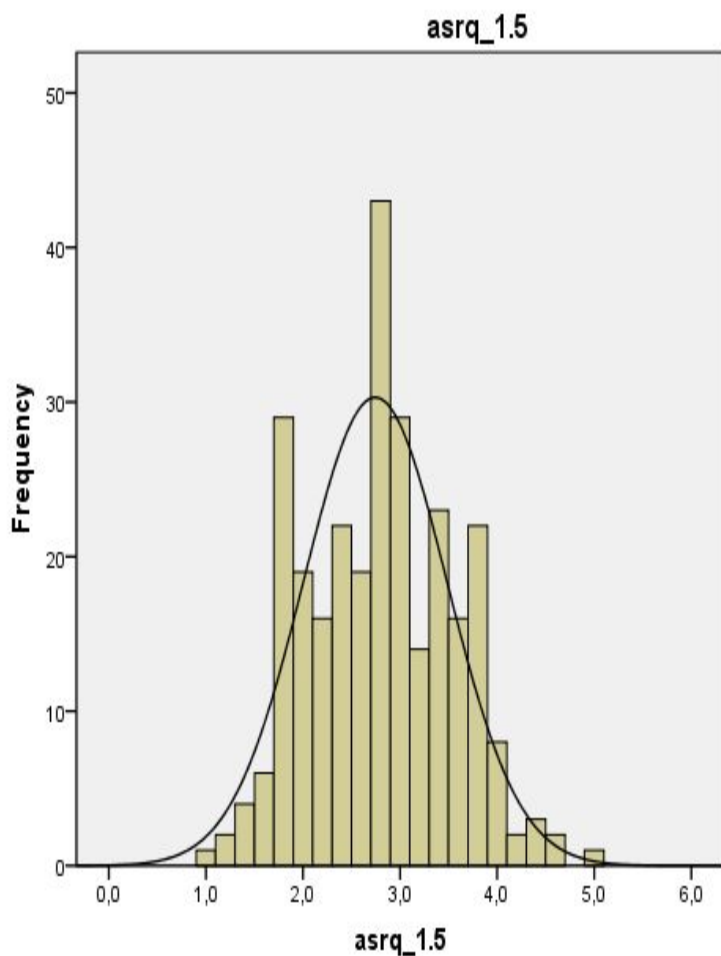
Раздел 2: Общие принципы статистического анализа данных

Графическая оценка нормальности распределения:

1. *Непрерывность распределения* - отсутствие в нем пропусков.
2. *Одно- или мультимодальность* – у нормального распределения только одна вершина.
3. *Ассиметрия (skewness)* – отклонение вершины от центра (по модулю $<$ двойной станд. ошибки).
4. *Экцесс (kurtosis)* – «вытянутость» распределения, его относительная высота (по модулю $<$ двойной стандартной ошибки).

Раздел 2: Общие принципы статистического анализа данных

Нормальность распределения:



Раздел 2: Общие принципы статистического анализа данных

The screenshot shows the PASW Statistics Data Editor interface. The main window displays a data table with 18 rows and 4 columns. The first two columns are numbered 1 to 18. The third and fourth columns contain categorical data: 'woman' and 'man' with associated numerical values. The 'Analyze' menu is open, showing various statistical options, with 'Frequencies...' selected. The status bar at the bottom indicates 'PASW Statistics Processor is ready' and the system time is 3:32.

	number		
1	1		
2	2		
3	3		
4	4		
5	5		
6	6		
7	7		
8	8		
9	9		
10	10		
11	11		
12	12		
13	13	woman	12
14	14	woman	10
15	15	woman	12
16	16	man	12
17	17	woman	14
18	18	man	7

Visible: 3 of 3 Variables

Data View Variable View

Frequencies...

PASW Statistics Processor is ready

EN 3:32

Раздел 2: Общие принципы статистического анализа данных

*Untitled1 [DataSet0] - PASW Statistics Data Editor

File Edit View Data Transform Analyze Direct Marketing Graphs Utilities Add-ons Window Help

1: number 1 Visible: 4 of 4 Variables

	number	gender	age	smoke	var	var	var	var	var	var	var	var	var	var	var	var
1	1	man														
2	2	man														
3	3	man														
4	4	man														
5	5	woman														
6	6	man														
7	7	woman														
8	8	woman														
9	9	man	12	yes												
10	10	man	15	no												
11	11	woman	12	yes												
12	12	man	9	no												
13	13	woman	12	yes												
14	14	woman	10	no												
15	15	woman	12	yes												
16	16	man	12	no												
17	17	woman	14	yes												
18	18	man	7	no												

1: number 1

Visible: 4 of 4 Variables

18

Data View Variable View

PASW Statistics Processor is ready

EN 2:54

Frequencies

Variable(s): age

number
gender
smoke

Statistics...
Charts...
Format...

Display frequency tables

OK Paste Reset Cancel

Frequencies: Statistics

Percentile Values

Quartiles

Cut points for: 10 equal groups

Percentile(s):

Add
Change
Remove

Central Tendency

Mean
 Median
 Mode
 Sum

Values are group midpoints

Dispersion

Std. deviation Minimum
 Variance Maximum
 Range S.E. mean

Distribution

Skewness
 Kurtosis

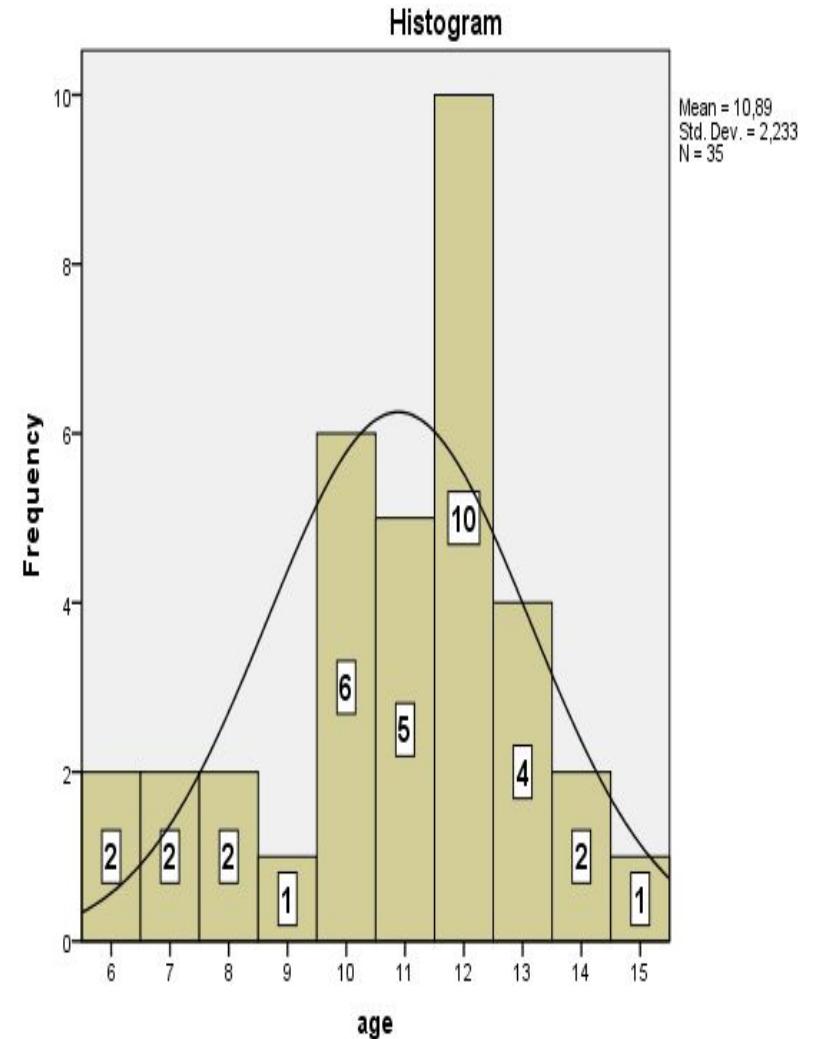
Continue Cancel Help

Раздел 2: Общие принципы статистического анализа данных

Statistics

age

N	Valid	35
	Missing	0
Skewness		-,638
Std. Error of Skewness		,398
Kurtosis		-,009
Std. Error of Kurtosis		,778



Раздел 2: Общие принципы статистического анализа данных

The screenshot shows the PASW Statistics Data Editor interface. The main window displays a data table with 18 rows and 5 columns. The first column is labeled 'number' and contains values from 1 to 18. The second column is labeled 'number' and contains values from 1 to 18. The third column contains categorical values: 'woman', 'woman', 'woman', 'man', 'woman', 'man', 'man', 'woman', 'man', 'man', 'woman', 'woman', 'man', 'man', 'woman', 'man', 'man'. The fourth column contains numerical values: 12, 10, 12, 12, 14, 7, 12, 10, 12, 14, 7, 12, 10, 12, 14, 7, 12. The fifth column contains categorical values: 'yes', 'no', 'yes', 'no', 'yes', 'no', 'yes', 'no', 'yes', 'no', 'yes', 'no', 'yes', 'no', 'yes', 'no', 'no'. The 'Analyze' menu is open, showing various statistical options. The 'Crosstabs...' option is highlighted. The status bar at the bottom indicates 'PASW Statistics Processor is ready'.

number	number																
1	1																
2	2																
3	3																
4	4			no													
5	5			yes													
6	6			no													
7	7			yes													
8	8			no													
9	9			yes													
10	10			no													
11	11			yes													
12	12			no													
13	13	woman	12	yes													
14	14	woman	10	no													
15	15	woman	12	yes													
16	16	man	12	no													
17	17	woman	14	yes													
18	18	man	7	no													

Раздел 2: Общие принципы статистического анализа данных

*Untitled1 [DataSet0] - PASW Statistics Data Editor

File Edit View Data Transform Analyze Direct Marketing Graphs Utilities Add-ons Window Help

1: number 1 Visible: 4 of 4 Variables

	number	gender	age	smoke	var	var	var	var	var	var	var	var	var	var	var	var
1	1	man	11	yes												
2	2	man	8	no												
3	3	man	12	yes												
4	4	man	6	no												
5	5	woman	13	yes												
6	6	man	12	no												
7	7	woman	11	yes												
8	8	woman	10	no												
9	9	man	12	yes												
10	10	man	15	no												
11	11	woman	12	yes												
12	12	man	9	no												
13	13	woman	12	yes												
14	14	woman	10	no												
15	15	woman	12	yes												
16	16	man	12	no												
17	17	woman	14	yes												
18	18	man	7	no												

Crosstabs

Row(s): gender

Column(s): smoke

Layer 1 of 1

Previous Next

Display clustered bar charts

Suppress tables

OK Paste Reset Cancel Help

Data View Variable View

PASW Statistics Processor is ready

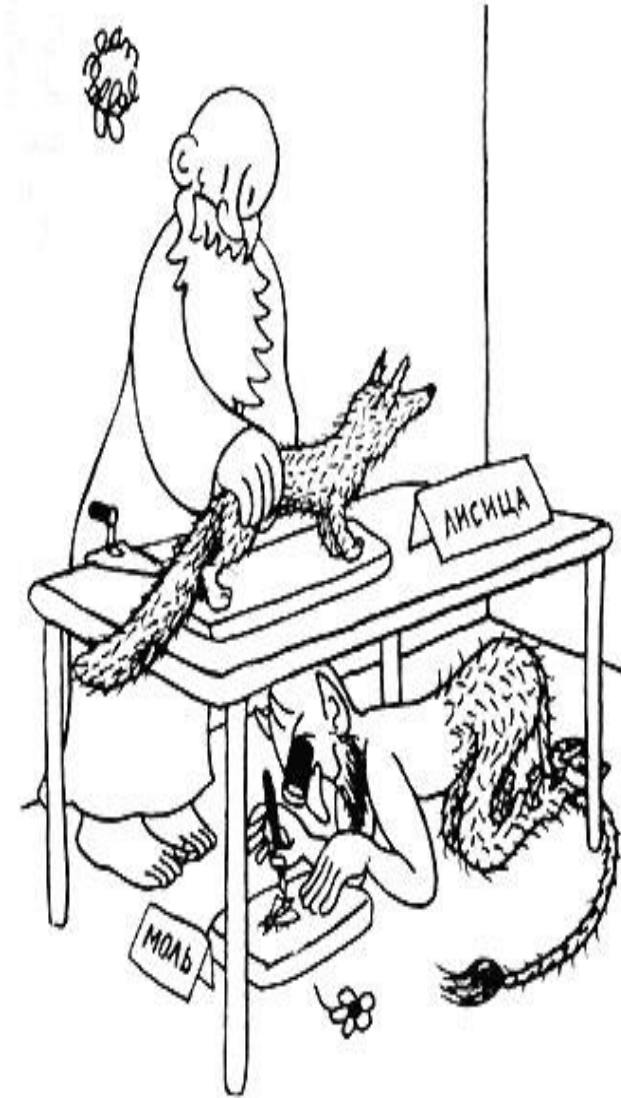
EN 23:01

Раздел 2: Общие принципы статистического анализа данных

gender * smoke Crosstabulation

Count

		smoke		Total
		yes	no	
gender	man	10	12	22
	woman	8	5	13
Total		18	17	35



Раздел 2: Общие принципы статистического анализа данных

		тип младшего сиблинга				Итого
		1	2	3	4	
тип старшего сиблинга	1	12	1	0	0	13
	2	2	6	2	2	12
	3	1	3	2	0	6
	4	0	0	0	2	2
Итого		15	10	4	4	33

Раздел 2: Общие принципы статистического анализа данных

Ключи опросника ШБУ:

Шкала	Вопросы
Доброжелательность окружающего мира	5* 10* 13* 15 18* 19* 27* 31 33*
Справедливость окружающего мира	6* 11 21 22 29* 34
Образ Я	2* 7* 12 17 23 35 37*
Удача	3 8* 14* 20* 25* 28 32 36
Уверенность в контроле над своей жизнью	1 4 9 16 24* 26* 30

**Спасибо за
внимание
и другие ВПФ**



*Jean
Eggs*