Building Powerful Graphic Displays to Discover and Convey EHDI Information

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National Center for Birth Defects and Developmental Disabilities Davison of Human development and Disability



Focus limited resources and staff time Build support from partners

What can charts do?



Convey important points already determined by the program to persuade others.

What can charts do?



2 Extract new insights from existing data.

Topics

- Basic types of questions and their associated charts
- Principles of good charts, and bad ones
- More advanced charting software
- Sources of more information on developing and using charts and graphs

In Tables, patterns within data often not readily apparent

Percent Vertigo Cases Reported by 6 Months						
County	2005	2006	2007	2008		
Hanford	85.25	87.47	92.97	94.86		
Dulcet	82.37	85.76	76.97	73.39		
Cornfield	75.65	77.33	79.87	80.76		
Eagleton	69.43	75.39	84.98	94.89		
Apple	65.78	70.56	79.76	83.03		
Beaver	64.99	68.32	72.87	65.86		
Farmwort	56.01	68.29	75.74	82.28		
Goshen	34.84	46.84	49.38	52.44		

Charts can make patterns pop out



Both Tables and Charts have their place

For precision → Use tables

To see overall	
relationships	\rightarrow
Use charts	

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BASIC CHART TYPES AND USES

BASIC CHART TYPES
Snapshot
Trend
Correlation

All the following basic charts were constructed in Microsoft Excel. Templates for these Excel charts are available from CDC EHDI.

SNAPSHOT

Part of WholeRankingDeviation

Part of Whole

What sub-groups make up what portion of the total group of interest?

Sample Questions

- What medical subspecialties are referring patients to audiologists?
- What hospitals are reporting what percentage of total screenings?

One value for each entity

One column of numbers totaling 100%

Descriptor	Percent of Total Reports
Southern Hosp	38
Memorial Hosp	25
Bright Days Birthing	15
Rural Acres Hosp	10
Mountain Center	6
Far Reaches Clinic	4
Unknown	2

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Percent of Total Screening Reports



Pie Chart is traditional

Consider using Column or Bar chart

Use just length of lines vs. area and colors

No need to refer to separate legend

38 40 30 25 20 15 10 10 6 4 2 0 Southern Memorial Bright Days Rural Acres Mountain Far Reaches Unknown Clinic Hosp Birthing Hosp Hosp Center

Percent of Total Screening Reports

RANKING

Sample Questions

- Which areas are performing best (or having most problems)?
- How much difference is there between the best and worst results?

	Annual Total	
Descriptors (with	Children Screened	
Long Names)	by 3 Months of Age	
Evergreen Center		
for Advanced Care	380	
Bronfenbrenner		
Resource		
Association	150	
Ignatius Ramsey		
Home	20	
Guttenberg		
Headquarters	40	
Foundation for		
Comfort Care	40	
Eastpoint Clinical		
Services	60	
Deacon and Lawford		
Hospital	100	
Keystone Health		
System	250	
Everley Place	20	
University of State		
for More Studies	250	
Central Care		
Services	320	

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Keystone Health	
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Central Care	
Services	320
Evergreen Center	
for Advanced Care	380
nor Auvanceu care	560

Sort before making Column/Bar chart to emphasize relative status and range



Percent of Total Reports

Relationships become clearer



Annual Total Children Screened by 3 Months of Age

If long names → consider Bar Chart with horizontal labels

DEVIATION FROM STANDARD

Sample Questions

 How much did different programs exceed (or fall short of) our goal or standard?

 How do their achievements seem to compare to one another?

Deviation

Calculate differences between actual performance and standard for each entity.

Convert to percent.

		Relation to	Percent Over/Under
Descriptor	Data	Benchmark	Standard
Beaufort Med Center	98	8	8.9
Harford County Service Center	98	8	8.9
Douglas County Hosp	94	4	4.4
Appelle Hosp	92	2	2.2
Farquhar Memorial	87	-3	-3.3
Corcoran Clinic	85	-5	-5.6
Evergreen Health System	72	-18	-20.0
Greenbaum and Owens Clinic	58	-32	-35.6

Graph to show over and under standard.

Percent Over/Under Standard





Sample Questions

How are things progressing over time?

- Getting better, stagnating or getting worse?
- Are all areas following the same general trend?
- Does the pace (slope) of the trend vary?

Multiple time periods for each entity

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Convert to \rightarrow



Line graph (with or without data points)



A COC

Trend

Trend may be in a **uniform direction**

Rate of change may vary



There may be no

uniform pattern

or

(Still valuable information)



CORRELATION

Sample Questions

Is there a possible link between Factor X and Factor Y?

- Are we more likely to get referrals from cities as opposed to rural areas?
- Could level of education be associated with loss to follow-up?

Scatter plots are good to suggest correlations



Enter data on two variables for multiple cases

	Population	No. Dx <
County	in 1000s	6 mo.
Hanford	40	50
Dulcet	50	120
Cornfield	125	270
Eagleton	5	3
Apple	500	679
Beaver	26	58
Farmworthy	95	259
Goshen	750	800
Indigo	1000	975
Jasper	225	380
Kilgore	10	197
Lambert	1000	875
Musette	600	750
Nordic	50	400
Oriole	150	390

Generate scatter plot graph

Strong pattern

County Population Size and Number Diagnosed by 6 Months



Little or no pattern



Note trend line and value to help emphasize the pattern

If there may be a possible relationship→ do further calculation to verify true correlation

County Population Size and Number Diagnosed by 6 Months



Templates for these Excel charts are available from CDC EHDI



EXAMPLES OF OTHER CHARTS

The views expressed by speakers and moderators do not necessarily reflect the official policies of the Department of Health and Human Services; nor does mention of trade names, commercial practices, or organizations imply endorsement by the U.S Government.

DHSPSHWA Summary Report



Sample of combined: Tables + Bar charts and trend line graphs

Bubble Chart



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Source of further information on bubble charts



Dense charts combine several features and cues to enrich the knowledge being conveyed.

•**Color** for geographic location

•Size indicates relative number of cases

•Position on X relative to Y indicates relationship between income and HIV infection.



When geographic location is important.



Some software includes mapping to provide geographic insight <u>Example: InstantAtlas</u>

Interactive maps Can compare areas using maps and charts to see clusters sharing the same characteristics.



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20

40

60

🔲 🗖 City of Houston

Can animate for trends



BASIC PRINCIPLES OF GOOD CHARTS

Charts serve the data



		Percent	t of Total	Screenir	ng Repor	ts	
40	38						
50	_	25					
20			15				
10				10			
						4	2
0							_
	Southern	Memorial	Bright Days Birthion	Rural Acres	Center	FarReaches	Unknown
			Perce	nt of Total Rep	orts		

	4,000	
	1,500	
	1,000	
3	1,500	A A
1	1,000	THOSE -
1	1,500	AT 22
	1,000	
	500	
		· · · · · · ·

County	2005	2006
Hanford	85	87
Dulcet	82	85
Cornfield	75	77
Eagleton	69	75
Apple	65	70
Beaver	64	68
Farmworthy	56	68
Goshen	34	46





Choose the right chart to interpret or highlight the specific data in question

Keep visuals simple

Eliminate anything that distracts from the point the data is making.





Avoid most fancy graphic elements and chart types available in Excel.

Percent Over/Under Standard Beaufort Med Center 10.0 5.0 0.0 Greenbaum and Owens Clinic Harford County Service Center -5.0 -10.0 -15.0 -20.0 -25.0 -30.0 -35.0 Evergreen Health System -40.0 Douglas County Hosp **Percent Vertigo Cases Reported** by 6 Months Appelle Hosp Farguhar Memorial 2005 2006 2007 2008

Start all axes at zero.

lf you need to highlight detail:

clearly indicate that this is a *section* of the overall graph.



Evergreen Center for Advanced Care Central Care Services Keystone Health System University of State for More Studies Bronfenbrenner Resource Association Deacon and Lawford Hospital Eastpoint Clinical Services Foundation for Comfort Care Guttenberg Headquarters Everley Place Ignatius Ramsey Home 50 100 150 200 250 300 350 400 0

Annual Total Children Screened by 3 Months of Age

Do not use *area* to indicate relative size of values.



People cannot compare areas as well as they can line lengths.



SUMMARY

Use charts to mine for possible insights into existing data based on hunches or standard questions





Frame questions carefully.

Choose the right chart to best highlight the factor you want





Remove anything that distracts from the main point of the data

Percent Vertigo Cases Reported by 6 Months







Follow up possible insights from graphs with more rigorous investigation and analysis

Use tables for precise data and fine comparisons of individual entities

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Goshen	34.84	46.84	49.38	52.44	

Use your "discovery" charts to make striking presentations

County Population Size and Number Diagnosed by 6 Months



For further information

CDC EHDI

- Some Outside References
 - Edward Tufte The Visual Display of Quantitative Information and other titles
 - Stephen Few Show Me the Numbers and other titles
 - Microsoft Excel 2007 Charts John Walkenbach

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For copies of Excel chart templates and other information related to today's presentation Contact Steve Richardson at

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For more information please contact Centers for Disease Control and Prevention

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The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.



National Center for Birth Defects and Developmental Disabilities Division of Human Development and Disability