



*Reliability and validity of self-report  
questionnaires completed by public  
health agency staff*

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# Outline

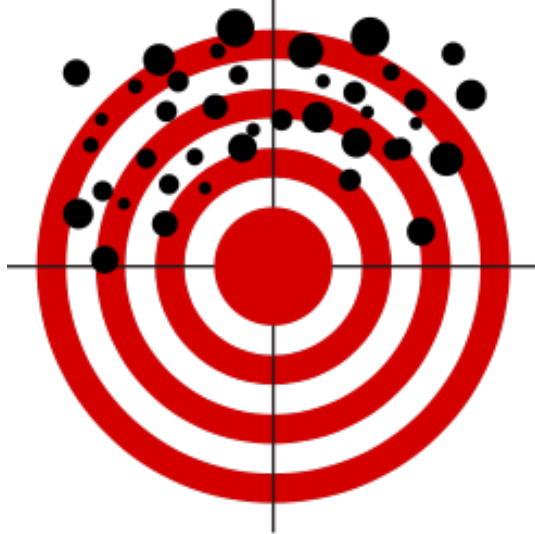
- Overview of the project
- Reliability
- Validity
- Conclusions

# Core Services Project Overview

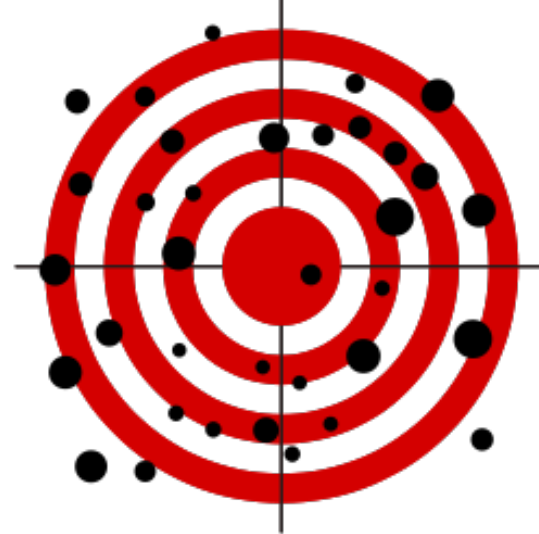
- Public Health Act of 2008 standardized core services in Colorado
  - Established 7 Essential Core Services
- Project measured impact of the Act
- Examined service availability, LPHA structure, funding, FTE
- Similar to measures collected by NACCHO, MPROVE

**Research Question:**

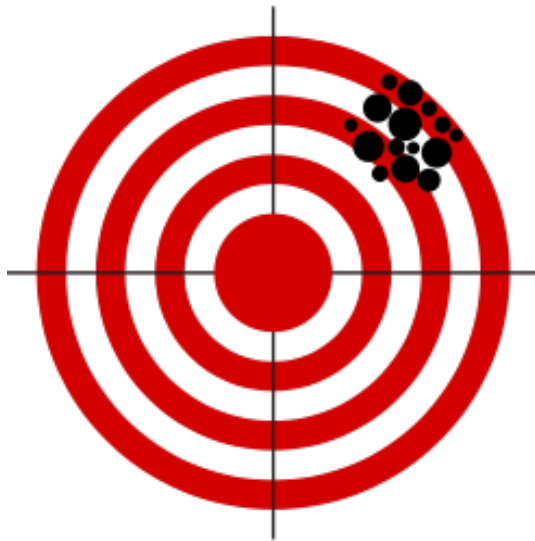
**Are the core service measures  
reliable and valid?**



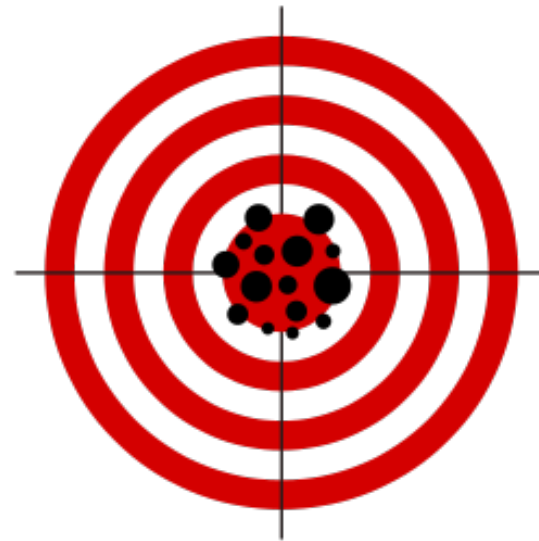
Unreliable & Invalid



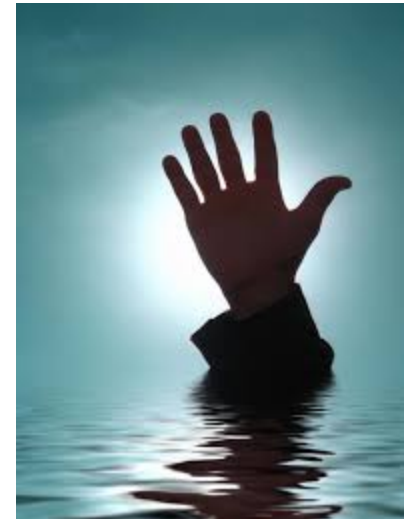
Unreliable, But Valid



Reliable, Not Valid



Both Reliable & Valid



# Data! And more data!!

- 107 measures where we tested reliability
  - Two different reliability measures
- 47 measures of validity
  - Multiple measures again

# Population and Health Promotion: Physical Activity

Variable	# of Levels	Percent Agreement	Simple Kappa
Physical Activity Education by LPHA	2	76.5%	0.1905
Physical Activity Education by Someone Else	2	82.4%	0.6434
Physical Activity Education Not Done	2	100.0%	1.0000
Physical Activity Education Media by LPHA	2	88.2%	0.7606
Physical Activity Education Media by Someone Else	2	88.2%	0.7463
Physical Activity Education Media Not Done	2	94.1%	0.8661
Physical Activity Cultural Materials by LPHA	2	70.6%	0.4056
Physical Activity Cultural Materials by Someone Else	2	64.7%	0.2388
Physical Activity Cultural Materials Not Done	2	70.6%	0.1414
Physical Activity Cultural Programs by LPHA	2	64.7%	0.1639
Physical Activity Cultural Programs by Someone Else	2	58.8%	0.0630
Physical Activity Cultural Programs Not Done	2	58.8%	0.1905
Physical Activity Training by LPHA	2	64.7%	0.2714
Physical Activity Training by Someone Else	2	70.6%	0.4138
Physical Activity Training Not Done	2	82.4%	0.5487
Physical Activity Community Development by LPHA	2	70.6%	0.4295
Physical Activity Development by Someone Else	2	82.4%	0.6531
Physical Activity Community Development Not Done	2	82.4%	0.5641
Physical Activity Policy Initiatives by LPHA	2	70.6%	0.3796
Physical Activity Policy Initiatives by Someone Else	2	88.2%	0.7571
Physical Activity Policy Initiatives Not Done	2	94.1%	0.8661





# **RELIABILITY**



## Reliability:

*If we asked the same question in the exact same way under the exact same circumstances, would we get the same answer?*

# Test-Retest Reliability

- Fills in survey/test at time A
- Allow for enough time to pass to forget how it was filled out but not enough time that the situation has changed
- Fills in survey/test at time B
- Compare results to see if there are significant differences

# Test-retest methods

- Selected 19 Agencies
- Agency filled out selected measures 2-4 weeks after initial survey
- Selected measures across different domains

# Reliability Methods

## Standard Approaches:

- Percent Agreement
  - Higher is better, possible range: 0-100
- Kappa: Compare how we did versus random chance
  - Possible range:
    - 1 (perfect) – 0 (random) –1 (bad)
  - Higher is better

# Interpreting Kappa

$< 0$	Less than chance agreement
0.01–0.20	Slight agreement
0.21– 0.40	Fair agreement
0.41–0.60	Moderate agreement
0.61–0.80	Substantial agreement
0.81–0.99	Almost perfect agreement

Source: Viera and Garrett, 2005

# Reliability: Methods II

- Weighted Kappa
  - For multiple categories
  - Answers further off are weighted more heavily than answers that are relatively close



# **RELIABILITY RESULTS**



# Administration and Governance

Variable	# of Levels	Percent Agreement	Simple Kappa	Weighted Kappa
Number of reps from County Commission	3	100.0%	1.0000	1.0000
Number reps from City Council	2	100.0%	1.0000	
Number other elected officials	2	100.0%	1.0000	
Number of other community reps	3	100.0%	1.0000	1.0000
Total Number of members on BOH	4	86.7%	0.7000	0.8780
BOH Meetings/Year	4	93.3%	0.8913	0.8069

# Assessment and Planning

Variable	# of Levels	Percent Agreement	Simple Kappa	Weighted Kappa
Time of Last Health Assessment	5	82.4%	0.2031	0.2917
Role in Assessment: CompCHA Lead	2	76.5%	0.3585	
Role in Assessment: Participated	2	82.4%	0.5984	
Role in Assessment: Provided data	2	70.6%	0.4218	
Role in Assessment: Other	2	76.5%	0.2609	
Staff Capacity	4	58.8%	0.4167	0.5436
Population Served Capacity	4	58.8%	0.4020	0.5108
Outcomes Capacity	4	76.5%	0.6731	0.6507
Best Practices Capacity	4	58.8%	0.3990	0.3561
Standards Capacity	4	41.2%	0.0710	0.0078
Supported Capacity	4	64.7%	0.4574	0.5526

# Reliability

- EPR: 8 of 9 measures  $k > 0.66$
- Admin and Gov: 6 of 6  $k > 0.7$
- Assessment and Planning: 1 of 11  $k > 0.6$ 
  - 5 of 11  $k < 0.4$
- Immunizations: 11 of 14  $k > 0.6$ 
  - All 3 measures of “someone else”  $k < 0.6$
- CD Capacity: 1 of 9  $k > 0.6$ 
  - 5 of 9  $k < 0.4$
- CD Funding: 5 of 5  $k > 0.8$

# Communicable Diseases I: Immunizations

Variable	# of Levels	Percent Agreement	Simple Kappa
Child Immunization Outreach by LPHA	2	100.0%	1.0000
Child Immunization Outreach by Someone Else	2	100.0%	1.0000
Child Immunization Outreach Not Done	2	100.0%	1.0000
Child Immunization Provider Ed by LPHA	2	100.0%	1.0000
Child Immunization Provider Ed by Someone Else	2	87.5%	0.4286
Child Immunization Provider Ed Not Done	2	100.0%	1.0000
Child Immunization Tracking by LPHA	2	100.0%	1.0000
Child Immunization Tracking by Someone Else	2	87.5%	-0.0667
Child Immunization Tracking Not Done	2	100.0%	1.0000
Child Immunization Monitoring by LPHA	2	87.5%	0.6000
Child Immunization Monitoring by Someone Else	2	93.8%	0.7647
Child Immunization Registry by LPHA	2	93.8%	0.8710
Child Immunization Registry by Someone Else	2	81.3%	0.5556
Child Immunization Registry Not Done	2	87.5%	0.5897

# Reliability PHP

- Tobacco: 19 measures
  - 4  $k > 0.6$
  - 12  $0.4 < k < 0.6$
  - 3  $k < 0.4$
  - 6 measures of LPHA activity  $k > 0.55$
  - 6 of 7 measures of “someone else”  $k < 0.6$
- Nutrition: 18 measures
  - 6  $k > 0.6$
  - 7  $0.4 < k < 0.6$
  - 5  $k < 0.4$

# Population and Health Promotion: Physical Activity

- Kappa range: 0.06-1.0
- Education: 5 of 6 above 0.65
  - Median: 0.7
- Cultural Materials / Programs: 5 of 6 below 0.23
  - range: 0.06-0.41
- Training, Development, Policy: 8 of 9 above 0.4
  - Median 0.55

# Population and Health Promotion

## Pregnancy Prevention

- Kappa range: 0.28-0.82
- 17 of 23 measures above 0.46
  - 11 above 0.6

## Oral Health

- Kappa range: 0.35-0.88
- 21 of 22 measures above 0.6
  - 12 above 0.7



# **VALIDITY**



# Validity

- *Truthfulness: Does the test measure what it purports to measure? The extent to which certain inferences can be made from test scores or other measurement. (Mehrens and Lehman, 1987)*
- *The degree to which they accomplish the purpose for which they are being used. (Worthen et al., 1993)*

# Construct Validity Methods

- Located similar measures in NACCHO profile
  - 47 total measures identified
- Measures included:
  - personnel employed
  - revenue/expenditures
  - surveillance, screening, inspections
  - direct services
  - prevention activities
- Correlated
  - Kappa

Example:

Core Services:

*Q: What role does your LPHA play in the direct (1-on-1) delivery of treatment for the below listed services?*

*Family Planning Services:*

*A: Primary Provider or Safety Net Provider*

NACCHO Profile:

*Q: Maternal and Child Health: Family Planning:*

*A: LHD Directly*

Example:

Core Services:

*Q: Structure of Agency: Please select ONE of the following to describe your local public health agency:*

*A: Single County Agency*

NACCHO Profile:

*Q: Which of the following best describes your LHD's organizational structure?*

*A: My LHD is a free-standing public health agency.*

# Validity: Revenue and FTE

Measure	Correlaton
Total Expenditures	0.999
Total Revenue	0.448
Total revenues from state sources	0.253
Total Revenues from Medicare / Medicaid	0.930
What is the total Full-time Equivalentents (FTEs)	0.997
Number of FTEs in Emergency Preparedness	0.784

# Structure

Measure	Correlation	Percent Agreement	Kappa
LPHA's budget NEXT fiscal year	0.326	62.22%	0.410
LPHA Structure	0.920	97.3%	0.917

# Inspections

Measure	Correlation	Percent Agreement	Kappa
Retail Food Inspections	0.863	93.33%	0.862
WIC/Nutrition Services	0.858	93.33%	0.848
WIC/Nutrition Services: Not Available	0.483	93.33%	0.378
Body Art: Inspections	0.847	93.18%	0.846
Body Art: Inspections: Not Done	0.368	65.91%	0.337

# Services

Measure	Correlation	Percent Agreement	Kappa
Family Planning Services: Primary Provider or Safety Net Provider	0.825	91.11%	0.822
Family Planning Services: Not Available	0.351	86.67%	0.220
Onsite Waste Water Monitoring; Licensing: LPHA	0.779	88.89%	0.778
Onsite Waste Water (or ISDS): Monitoring; Licensing: Not Done	0.564	95.56%	0.483
HIV: Screening: LPHA	0.775	88.89%	0.774
HIV: Screening: Not done	0.426	91.11%	0.308
Spa, swimming pool and natural bathing areas: Inspections: LPHA	0.756	86.36%	0.727
Spa, swimming pool and natural bathing areas: Inspections: Not Done	0.422	70.45%	0.353



# Validity Continued

Measure	Correlation	Percent Agreement	Kappa
Primary Provider or Safety Net Provider	0.726	84.44%	0.690
Healthy Communities (EPSDT): Not Available	0.232	86.67%	0.196
Childcare Facilities: Inspections: LPHA	0.630	82.22%	0.630
Childcare Facilities: Inspections: Not Done	-0.023	95.56%	-0.023
Has a comprehensive community health assessment been done in your jurisdiction?	0.619	71.74%	0.290

Measure	Correlation	Percent Agreement	Kappa
Retail Food Establishments: Outreach/ Education: LPHA	0.617	81.82%	0.617
Retail Food Establishments: Outreach/ Education: Not Done	0.476	95.45%	0.476
Summer Camps (day and overnight): Inspections: LPHA	0.596	79.55%	0.591
Summer Camps (overnight): Inspections: Not Done	0.365	79.55%	0.308
Nurse Home Visitor Programs: Primary Provider or Safety Net Provider	0.566	77.78%	0.557
Nurse Home Visitor Programs: Not Done	0.234	80.00%	0.211

# Validity Continued

Measure	Correlation	Percent Agreement	Kappa
Solid Waste Landfill: Monitoring: LPHA	0.470	79.55%	0.447
Solid Waste Landfill: Monitoring: Not Done	0.374	93.18%	0.365
Smoke-free Ordinances: Inspections: LPHA	0.433	76.19%	0.375
Smoke-free Ordinances: Inspections: Not Done	0.0387	47.62%	0.0233



# CONCLUSIONS

# Reliability Summary

## Medians:

- Admin and Governance (6 measures): 1.00
- Assessment and Planning (11 meas.): 0.42
- EPR (8 measures): 0.72
- Immunizations (14 measures): 0.92
- CD Capacity (9 measures): 0.27
- CD Funding (5 measures): 1.00
- PHP Tobacco (19 measures): 0.55
- PHP Nutrition (18 measures): 0.51
- PHP Physical Activity (22 measures): 0.42
- PHP Pregnancy Prevention (23 measures): 0.60
- PHP Oral Health (22 measures): 0.72
- PHP Capacity (8 measures): 0.61

# Validity Summary

- High concordance on measures about the LPHA itself
  - Funding
  - Services
  - Inspections
- Lower concordance on measures about what happens *elsewhere* in community
  - Not done
  - Done by someone else

# Conclusions

- Reliability and validity high for measures asking about structure, funding, services provided by LPHA
- Reliability concerns about questions about capacity or projections
- Validity concerns about measures asking about services provided elsewhere in community



# **SUPPLEMENTAL MATERIAL**



# Emergency Preparedness and Response

Variable	# of Levels	Percent Agreement	Simple Kappa	Weighted Kappa
EPR Capacity Change	3	70.6%	0.5952	0.4883
EPR Overall Capacity	4	70.6%	0.6119	0.7696
EPR Staff Capacity	4	82.4%	0.7723	0.8238
EPR Population Served Capacity	4	58.8%	0.4413	0.6648
EPR Outcomes Capacity	4	70.6%	0.6154	0.7859
EPR Best Practices Capacity	4	64.7%	0.5049	0.7243
EPR Standards Capacity	4	94.1%	0.9128	0.9518
EPR Supported Capacity	4	70.6%	0.5913	0.7273

# Communicable Diseases 2: Capacity

Variable	# of Levels	Percent Agreement	Simple Kappa	Weighted Kappa
Role in Delivery of Immunization	4	87.5%	0.7143	0.7143
Capacity Change	3	81.3%	0.6903	0.5862
Overall Capacity	4	50.0%	0.2686	0.1938
Staff Capacity	4	62.5%	0.4545	0.4530
Population Served Capacity	4	50.0%	0.2515	0.3846
Outcomes Capacity	4	37.5%	0.1257	0.2464
Best Practices Capacity	4	62.5%	0.3924	0.3118
Standards Capacity	4	50.0%	0.2195	0.2727
Supported Capacity	4	62.5%	0.4545	0.5152

# Communicable Diseases 3: Funding

Variable	# of Levels	Percent Agreement	Simple Kappa	Weighted Kappa
Funding from Local Sources	2	100.0%	1.0000	
Funding from Federal Sources	2	100.0%	1.0000	
Funding from Private Source	2	100.0%	1.0000	
Funding from Medicaid/Medicare	5	93.8%	0.8351	0.8361
Funding from Nonclinical Fees	2	100.0%	1.0000	

# Population and Health Promotion: Tobacco

Variable	# of Levels	Percent Agreement	Simple Kappa
Tobacco Education by Someone Else	2	70.6%	0.4056
Tobacco Education Media by LPHA	2	88.2%	0.7606
Tobacco Education Media by Someone Else	2	82.4%	0.5984
Tobacco Education Media Not Done	2	100.0%	1.0000
Tobacco Cultural Materials by LPHA	2	82.4%	0.5984
Tobacco Cultural Materials by Someone Else	2	76.5%	0.4426
Tobacco Cultural Materials Not Done	2	82.4%	0.5487
Tobacco Cultural Programs by LPHA	2	76.5%	0.5526
Tobacco Cultural Programs by Someone Else	2	88.2%	0.4333
Tobacco Cultural Programs Not Done	2	82.4%	0.6434
Tobacco Training by LPHA	2	76.5%	0.5211
Tobacco Training by Someone Else	2	82.4%	0.4848
Tobacco Training Not Done	2	64.7%	0.1639
Tobacco Community Development by LPHA	2	76.5%	0.5278
Tobacco Community Development by Someone Else	2	82.4%	0.4632
Tobacco Community Development Not Done	2	70.6%	0.3307
Tobacco Policy Initiatives by LPHA	2	82.4%	0.6434
Tobacco Policy Initiatives by Someone Else	2	82.4%	0.5984
Tobacco Policy Initiatives Not Done	2	76.5%	0.3585

# Population and Health Promotion: Nutrition

Variable	# of Levels	Percent Agreement	Simple Kappa
Nutrition Education by Someone Else	2	64.7%	0.3014
Nutrition Education Not Done	2	100.0%	1.0000
Nutrition Education Media by LPHA	2	88.2%	0.7606
Nutrition Education Media by Someone Else	2	70.6%	0.4056
Nutrition Education Media Not Done	2	88.2%	0.6731
Nutrition Cultural Materials by LPHA	2	76.5%	0.4333
Nutrition Cultural Materials by Someone Else	2	76.5%	0.5342
Nutrition Cultural Programs by LPHA	2	70.6%	0.3796
Nutrition Cultural Programs by Someone Else	2	70.6%	0.3972
Nutrition Cultural Programs Not Done	2	70.6%	0.1414
Nutrition Training by LPHA	2	76.5%	0.4687
Nutrition Training by Someone Else	2	70.6%	0.4295
Nutrition Community Development by LPHA	2	100.0%	1.0000
Nutrition Community Development by Someone Else	2	64.7%	0.3014
Nutrition Community Development Not Done	2	94.1%	0.8496
Nutrition Policy Initiatives by LPHA	2	76.5%	0.5143
Nutrition Policy Initiatives by Someone Else	2	82.4%	0.5984
Nutrition Policy Initiatives Not Done	2	88.2%	0.7463

# Population and Health Promotion: Physical Activity

Variable	# of Levels	Percent Agreement	Simple Kappa
Physical Activity Education by LPHA	2	76.5%	0.1905
Physical Activity Education by Someone Else	2	82.4%	0.6434
Physical Activity Education Not Done	2	100.0%	1.0000
Physical Activity Education Media by LPHA	2	88.2%	0.7606
Physical Activity Education Media by Someone Else	2	88.2%	0.7463
Physical Activity Education Media Not Done	2	94.1%	0.8661
Physical Activity Cultural Materials by LPHA	2	70.6%	0.4056
Physical Activity Cultural Materials by Someone Else	2	64.7%	0.2388
Physical Activity Cultural Materials Not Done	2	70.6%	0.1414
Physical Activity Cultural Programs by LPHA	2	64.7%	0.1639
Physical Activity Cultural Programs by Someone Else	2	58.8%	0.0630
Physical Activity Cultural Programs Not Done	2	58.8%	0.1905
Physical Activity Training by LPHA	2	64.7%	0.2714
Physical Activity Training by Someone Else	2	70.6%	0.4138
Physical Activity Training Not Done	2	82.4%	0.5487
Physical Activity Community Development by LPHA	2	70.6%	0.4295
Physical Activity Development by Someone Else	2	82.4%	0.6531
Physical Activity Community Development Not Done	2	82.4%	0.5641
Physical Activity Policy Initiatives by LPHA	2	70.6%	0.3796
Physical Activity Policy Initiatives by Someone Else	2	88.2%	0.7571
Physical Activity Policy Initiatives Not Done	2	94.1%	0.8661

# Population and Health Promotion: Pregnancy Prevention

Variable	# of Levels	Percent Agreement	Simple Kappa
Role in Delivery of Cervical Cancer Screening	4	64.7%	0.5256
Role in Delivery of Breast Cancer Screening	4	70.6%	0.5991
Unintended Pregnancy Education by LPHA	2	82.4%	0.4632
Unintended Pregnancy Education by Someone Else	2	58.8%	0.2874
Unintended Pregnancy Education Not Done	2	94.1%	0.6383
Unintended Pregnancy Media by LPHA	2	88.2%	0.7213
Unintended Pregnancy Media by Someone Else	2	76.5%	0.5278
Unintended Pregnancy Media Not Done	2	82.4%	0.5984
Unintended Pregnancy Cultural Materials by LPHA	2	82.4%	0.6434
Unintended Pregnancy Cultural Materials by Someone Else	2	82.4%	0.6434
Unintended Pregnancy Cultural Materials Not Done	2	94.1%	0.8211
Unintended Pregnancy Cultural Programs by LPHA	2	82.4%	0.5984
Unintended Pregnancy Cultural Programs by Someone Else	2	82.4%	0.6434
Unintended Pregnancy Cultural Programs Not Done	2	76.5%	0.4925

# Population and Health Promotion: Pregnancy Prevention

Variable	# of Levels	Percent Agreement	Simple Kappa
Unintended Pregnancy Training by LPHA	2	64.7%	0.2817
Unintended Pregnancy Training by Someone Else	2	70.6%	0.4218
Unintended Pregnancy Training Not Done	2	88.2%	0.6047
Unintended Pregnancy Development by LPHA	2	94.1%	0.8496
Unintended Pregnancy Development by Someone Else	2	70.6%	0.4056
Unintended Pregnancy Development Not Done	2	82.4%	0.6383
Unintended Pregnancy Policy Initiatives by LPHA	2	94.1%	0.8759
Unintended Pregnancy Policy Initiatives by Someone Else	2	76.5%	0.5211
Unintended Pregnancy Policy Initiatives Not Done	2	88.2%	0.7571



# Population and Health Promotion: Oral Health

Variable	# of Levels	Percent Agreement	Simple Kappa
Oral Education by LPHA	2	88.2%	0.5952
Oral Education by Someone Else	2	88.2%	0.7213
Oral Education Not Done	2	94.1%	0.6383
Oral Media by LPHA	2	82.4%	0.6577
Oral Media by Someone Else	2	76.5%	0.5211
Oral Media Not Done	2	76.5%	0.4925
Oral Cultural Materials by LPHA	2	88.2%	0.7571
Oral Cultural Materials by Someone Else	2	82.4%	0.6531
Oral Cultural Materials Not Done	2	88.2%	0.6047
Oral Cultural Programs by LPHA	2	88.2%	0.7606
Oral Cultural Programs by Someone Else	2	88.2%	0.7671
Oral Cultural Programs Not Done	2	94.1%	0.8661

# Population and Health Promotion: Oral Health

Variable	# of Levels	Percent Agreement	Simple Kappa
Oral Training by LPHA	2	88.2%	0.7639
Oral Training by Someone Else	2	82.4%	0.6531
Oral Training Not Done	2	88.2%	0.7463
Oral Development by LPHA	2	94.1%	0.8811
Oral Development by Someone Else	2	88.2%	0.7639
Oral Development Not Done	2	88.2%	0.7424
Oral Policy Initiatives by LPHA	2	88.2%	0.7571
Oral Policy Initiatives by Someone Else	2	88.2%	0.7606
Oral Policy Initiatives Not Done	2	82.4%	0.6434
Role in Delivery of Family Planning	4	52.9%	0.3585

# Population and Health Promotion: Capacity

Variable	# of Levels	Percent Agreement	Simple Kappa	Weighted Kappa
Capacity Change	3	76.5%	0.6440	0.6531
Overall Capacity	4	47.1%	0.3077	0.4384
Staff Capacity	4	58.8%	0.4333	0.6222
Population Served Capacity	4	58.8%	0.4541	0.6246
Outcomes Capacity	4	47.1%	0.2917	0.4687
Best Practices Capacity	4	58.8%	0.3770	0.4742
Standards Capacity	4	62.5%	0.4696	0.5971
Supported Capacity	4	58.8%	0.4306	0.6264