DATA TRIANGULATION IN PUBLIC HEALTH

NHSRC

New Delhi

Data in public health

- Public health demands integration of knowledge from various health and social science disciplines.

- Overlaps, duplications, vertical approach, etc., to health issues have become a practice lately which result in multiple, voluminous & partially complete data that sparingly facilitate decision-making/planning.

- Every data source has certain strength, limitations, & a defined scope.

- Strategic health interventions demand syntheses, analyses, & interpretation of all available data known as data triangulation.

Triangulation in public health

- Triangulation refers to finding a position – a fixed point – by getting bearings on different objects.

- Similar to evidence mapping & realist critical interpretive synthesis (summarizes: how we got to where we are & what we do next)

- Demands critical interpretive synthesis to build theory that explains observations.

- Review and interpretation of multiple data sources that bear on different facets of a broad public health question to identify factors that underlie the observed data and to facilitate decision making.

- Added dimensions are: stakeholder-driven processes for generating key questions, identifying relevant existing data sources, formulating hypotheses and interpreting and using data.

- Successful public health/primary care triangulation models are available from Uganda, Cambodia, Thailand, USA.

Advantages of triangulation

- To establish internal and external validity and improves accuracy.

- Acknowledges/reveals contradictory findings, facilitates in-depth understanding; adds richness & complexity to an inquiry and suggests areas for future research & formulation of hypotheses.

- Strengthens interpretation, rational explanation and improves decision-making, confirms or refutes explanatory hypotheses, compares & contrasts data derived from non-identical methodologies.

- Enhances utility of data, credibility and persuasiveness of a health matter.

- Develops a composite and holistic picture, while accepting degree of uncertainty

Types of data triangulation

- 4 types of triangulation (Denzin, 1970):
    - Data triangulation: data gathered through different samples and at different times are compared
    - Investigator triangulation: more than one investigator examines the same question and results are compared
    - Theory triangulation: different theoretical constructs are applied to the same observed data.
    - Method triangulation: phenomena are examined using different methods. Similar to explanatory/nested model: where mixed qualitative & quantitative method explain complex phenomena.
- Data transformation design model (McIlvain et al., 2002) for primary healthcare suggests correlation & triangulation of data available from prevalence studies, retrospective studies, or prospective studies.

Salient features

Public health triangulation analysis	Conventional epidemiologic analysis
Inductive, empirical	Deductive
Emphasis on 'best possible' existing data	Emphasis on data of highest scientific rigor
Focus on plausibility as basis for conclusions (with or without statistics)	Focus on statistics as basis for conclusions
Focus on external validity: "Can observed effects be generalized to the larger population?"	Focus on internal validity: "Did A cause B in our study?"
Based on inter-connected pieces of the same situation	Based on independent samples
Qualitative interpretation	Mathematical modeling
Goal: public health decision-making	Goal: increasing scientific knowledge

Triangulation for HMIS

- Purpose:
  - To improve reliability & confidence in HMIS data
  - To validate HMIS data to facilitate use for disaggregated levels (e.g., if District data are valid, then it is likely that facility level data will be more usable for action)

What are apices of triangle?
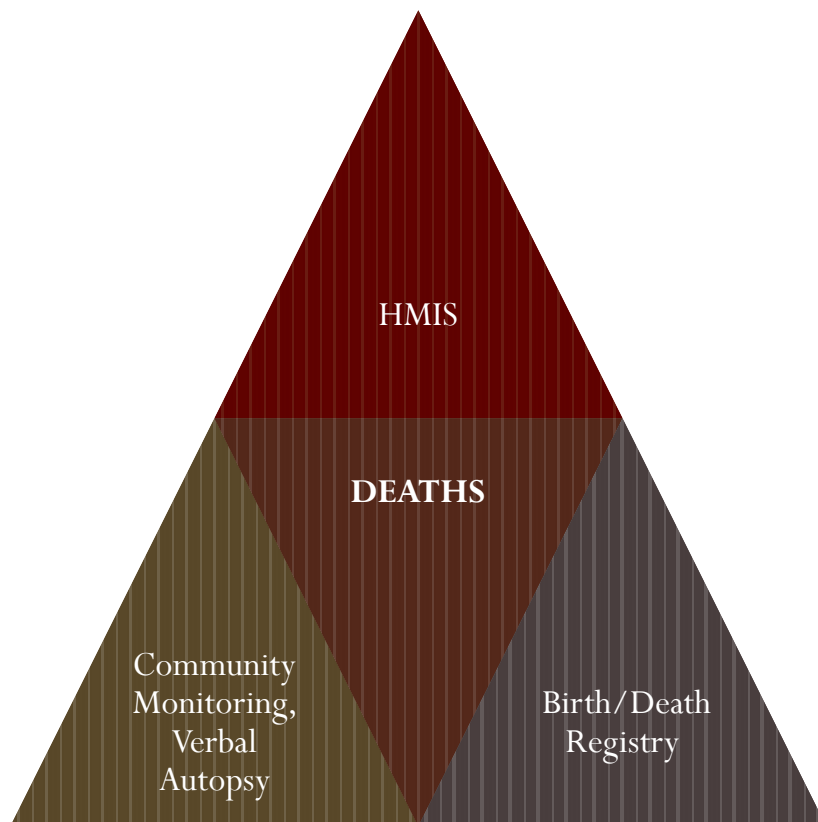
Issues

1. Complexity of case definitions
2. Period of data collection

Uses

1. To find when HMIS gets underreported
2. To improve training inputs for service provider reporting
3. To improve data completeness

What are apices of triangle?
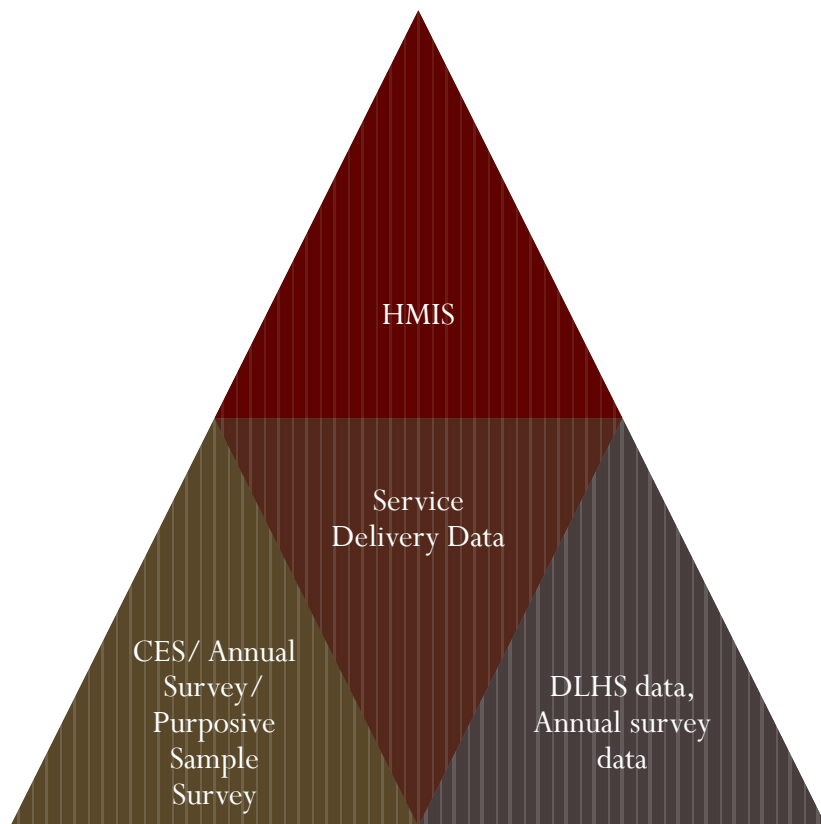
- External Triangulation

Issues

1. Dissimilar definitions

2. Period of data collection

Uses

1. To gain both provider & consumer perspective

2. To improve external validity

What are apices of triangle?
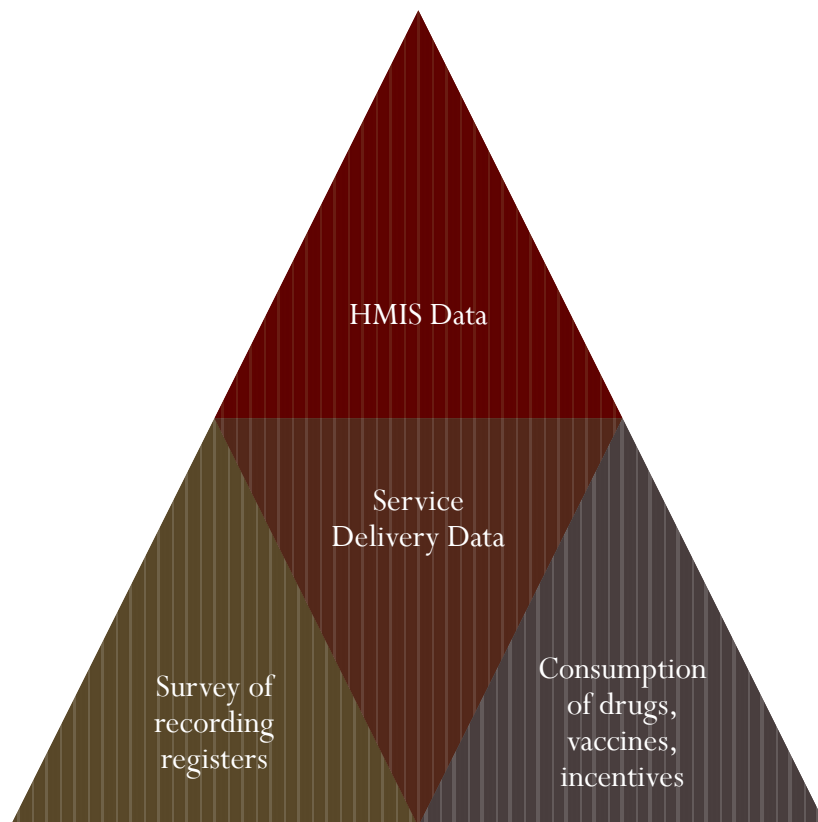
- Internal Triangulation

Issues

1. Time lapse

2. Denominator

Uses

1. Comparison provider / consumer

2. Equity analyses

Public health triangulation is not…

- Conventional meta analysis which combines methodologically similar data sets. Public health triangulation examines methodologically dissimilar data to see if they corroborate each other.

- Systematic review of the published literature. It involves review of unpublished/published data, reports, programmatic data, expert opinion, meta-analyses, and systematic reviews.

- Primary data collection.

- A method to evaluate the performance of a newer data gathering method against an established "gold standard".

- A technique for rapid assessment that involve assessments in a microenvironment with data collected prospectively as well as retrospectively.

- A substitute to formal evaluations of interventions, carefully constructed surveillance systems, or formal monitoring and evaluation activities.

Limitations of public health triangulation

- Unavailability of suitable, unbiased, externally valid data
- Ecological fallacy: trend data are not linked at the level of the individuals
- "Data dredging": analyzing large data sets without null hypotheses and often failing to use correct statistical tests for multiple comparisons.
- Rejection of non-supportive data for lack of clear reasons.
- Engagement of all stakeholders is not feasible.
- Reproducibility of results affected by over interpretation of data and ignoring data that do not fit hypotheses.

DLHS-HMIS Comparison

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Background

- Objective: to determine if HMIS data are incomparable to DLHS data and whether differences are statistically significant.

- DLHS3 (2007-08) data were compared with HMIS (2009-10) data for 590 districts of 27 States in the country.

- 'Incomparable' was defined as difference of more than $\pm 10\%$ between 2 data sets, else 'comparable/concordant'.

- Differences were calculated and States/Districts classified as:
  - Positively concordant   Positively discordant
  - Negatively concordant   Negatively discordant

- Mean differences between four groups were tested using ANOVA ($\alpha=0.05$) for each State to determine if differences were statistically significant.

Background

Data were compared for 14 health indicators, definitions of which are similar and comparable:

- ANC registration in first trimester
- Home deliveries
- Home deliveries by skilled birth attendant
- Iron folic acid during pregnancy
- Postnatal complications attended
- Sterilization –male
- Sterilization-female
- Intrauterine device insertions
- Condoms

- Oral emergency contraceptive pills
- Emergency contraceptive pills
- Newborns breastfed within 1 hour of birth
- Reproductive/sexually transmitted infections treated
- HIV test-female

Salient features of 2 data sets

- Time period: HMIS is for 2009-10 & DLHS3 is for 2007-08. In DLHS women report for event experienced 2004 or earlier.

- Data source: HMIS is provider reported. DLHS is consumer reported.

- Potential information bias: HMIS will be over-report & DLHS will be underreport.

- Methodology/Design: HMIS is routine reporting by provider. DLHS is a survey & respondent is consumer.

Salient features of 2 data sets

- Site: HMIS program focus is rural. DLHS both rural & urban. HMIS reflects success/failure of 1 program whereas DLHS reflects success/failure of all health programs in the country.

- Respondent: In HMIS providers (private) are not obliged to report . In DLHS there is only 1 respondent. In HMIS there are multiple respondents for one event (e.g., institutional deliveries reported by facilities as well as ANMs)

- Denominator/base-population: In DLHS base-population is ever-married women 15-45yrs old who had their last live/still birth since 1/1/04. In HMIS base-population is population of the district as available from SRS.

RESULTS

ANC registration in trimester1
Concordant States

STATES (12, 44%)	DLHS3	HMIS	Difference
Tamilnadu	76.8	76.27	0.53
Andhra Pradesh	67.3	66.44	0.86
Assam	39.1	37.85	1.25
Mizoram	43.9	42.42	1.48
Punjab	62.5	58.65	3.85
Jharkhand	30.8	26.4	4.40
J&K	56.6	49.89	6.71
Gujarat	52.3	60.38	-8.08
Chhattisgarh	38.5	43.16	-4.66
West Bengal	42.5	45.86	-3.36
Tripura	39.6	39.92	-0.32
Meghalaya	24.6	26.89	-2.29

ANC registration in trimester1
Concordant Districts

No. of Districts (207, 35%)			
Districts of….	Positive Concordance	Negative Concordance	Discordant
Orissa	12	2	16
Tamilnadu	11	5	15
Assam	8	6	13
Maharashtra	7	9	19
Andhra Pradesh	5	3	15
Arunachal Pradesh	2	3	11
Bihar	3	4	31
Haryana	5	2	13
Himachal Pradesh	1	3	8
Punjab	3	3	14
Jharkhand	3	3	16
Madhya Pradesh	4	14	32
Mizoram	3	1	4

Difference statistically insignificant (P>0.05)

ANC registration in trimester1
Concordant Districts

No. of Districts (207, 35%)			
Districts of….	Positive Concordance	Negative Concordance	Discordant
Karnataka	6	4	17
Gujarat	5	9	12
J&K	3	1	18
Uttar Pradesh	4	10	57
Chhattisgarh	4	3	9
West Bengal	4	7	8
Sikkim	2	0	2
Manipur	2	0	7
Tripura	1	1	2
Meghalaya	1	4	2
Uttarakhand	1	2	10
Rajasthan	1	7	25
Total (207, 35%)	**101**	**106**	**376**

Difference statistically insignificant (P>0.05)

Home Deliveries
Concordant States

STATES (4, 15%)	DLHS	HMIS	Difference
Kerala	0.6	0.29	0.31
Punjab	36.5	35.62	0.88
Himachal	51.2	47.14	4.06
Tamilnadu	5.7	0.51	5.19

Home Deliveries
Concordant Districts

No. of Districts (112, 19%)			
Districts of….	Positive Concordance	Negative Concordance	Discordant
Tamilnadu	28	0	3
Punjab	8	1	11
Himachal Pradesh	8	3	1
Kerala	4	10	0
Maharashtra	6	0	29
West Bengal	6	1	12
ANDRA PR	4	1	18
Uttar Pr	4	5	62
Karnataka	3	0	24
Mizoram	3	0	5
Manipur	3	1	5

Difference statistically insignificant (P>0.05)

Home Deliveries
Concordant Districts

No. of Districts (112, 19%)			
Districts of….	Positive Concordance	Negative Concordance	Discordant
J&K State	2	0	20
Meghalaya	2	1	4
Chhattisgarh	1	0	15
Gujarat	1	0	25
Haryana	1	1	18
Madhya Pradesh	1	0	49
Sikkim	1	1	2
Total (112, 19%)	**86**	**26**	303

Difference statistically insignificant (P>0.05)

Home deliveries by SBAs
Concordant States

STATES (21, 78%)	DLHS3	HMIS	Difference
Gujarat	5.2	3.54	1.66
West Bengal	2.4	1.15	1.25
Karnataka	6.5	5.35	1.15
Tamilnadu	1.5	0.37	1.13
Orissa	6.7	6.25	0.45
Manipur	14.3	14.09	0.21

Home deliveries by SBAs
Concordant States

STATES (21, 78%)	DLHS3	HMIS	Difference
Kerala	0	0.03	-0.03
Assam	4.8	5.05	-0.25
Rajasthan	7.2	7.62	-0.42
Tripura	1	1.44	-0.44
Andhra Pradesh	3.8	4.91	-1.11
Arunachal	1.2	2.88	-1.68
Punjab	13.8	16.56	-2.76
Meghalaya	4.4	7.2	-2.80
Maharashtra	5.7	9.01	-3.31
MP	3	6.79	-3.79
Mizoram	7.6	11.47	-3.87
Sikkim	7.2	11.27	-4.07
Bihar	4.2	9.55	-5.35
Himachal	2.6	8.52	-5.92
Haryana	6.4	13.52	-7.12

Home deliveries by SBAs
Concordant Districts

No. of Districts (415, 70%)			
Districts of….	Positive Concordance	Negative Concordance	Discordant
Andhra Pradesh	10	12	1
Arunachal Pradesh	5	7	4
ASSAM	12	9	6
Bihar	16	14	7
Chhattisgarh	1	7	8
Gujarat	18	6	2
Haryana	5	9	6
Himachal	0	8	4
J&K State	4	6	12
Jharkhand	3	3	16
Karnataka	19	7	1
Kerala	0	14	0
Madhya Pradesh	19	17	14

Difference statistically insignificant (P>0.05)

Home deliveries by SBAs
Concordant Districts

No. of Districts (417, 70%)			
Districts of….	Positive Concordance	Negative Concordance	Discordant
Maharashtra	14	16	5
Manipur	4	1	4
Meghalaya	2	4	1
Mizoram	1	4	3
Orissa	13	14	3
Punjab	7	8	5
Rajasthan	14	17	2
Sikkim	0	4	0
Tamil Nadu	25	4	2
TRIPURA	3	1	0
Uttar Pr	2	5	1
Uttarakhand	0	4	9
West Bengal	15	2	2
Total (415, 70%)	**212**	**203**	**118**

Difference statistically insignificant (P>0.05)

Newborns breastfed within 1hr of birth
Concordant States

STATES (7, 26%)	DLHS3	HMIS	Difference
Tamilnadu	76.1	70.62	5.48
Meghalaya	73.6	69.48	4.12
Assam	64.7	60.79	3.91
Orissa	63.2	63.14	0.06
J&K	54.1	54.98	-0.88
Uttarakhand	63.5	66.14	-2.64
Chhattisgarh	49.6	52.85	-3.25

Newborns breastfed within 1hr of birth

Concordant Districts

No. of Districts (69, 12%)			
Districts of....	Positive Concordance	Negative Concordance	Discordant
Andhra Pradesh	1	1	21
ASSAM	3	1	23
Bihar	4	3	31
Chhattisgarh	0	2	14
Gujarat	0	1	25
Haryana	1	0	19
Himachal	0	3	9
J&K State	1	1	20
Jharkhand	2	3	17
Kerala	1	2	11
Madhya P	0	6	44
Maharashtra	1	1	33

Difference statistically insignificant (P>0.05)

Newborns breastfed within 1hr of birth
Concordant Districts

No. of Districts (69, 12%)			
Districts of….	Positive Concordance	Negative Concordance	Discordant
Meghalaya	0	1	5
Orissa	2	5	23
Punjab	0	1	19
Rajasthan	0	1	32
Tamil Nadu	4	7	20
Uttar Pr	3	3	65
Uttarakhand	2	1	10
West Bengal	0	1	18
Total (69, 12%)	25	44	459

Difference statistically insignificant (P>0.05)

IFA during pregnancy
Concordant States

STATES (4, 15%)	DLHS3	HMIS	Difference
Manipur	38.1	28.66	9.44
Sikkim	33.7	37.83	-4.13
Tamilnadu	54.7	60.48	-5.78
Karnataka	64	71.62	-7.62

IFA during pregnancy
Concordant Districts

No. of Districts (64, 11%)			
Districts of….	Positive Concordance	Negative Concordance	Discordant
Arunachal Prade	2	1	13
ASSAM	0	1	26
Bihar	2	2	34
Himachal	0	3	9
Jharkhand	1	1	20
Karnataka	6	8	13
Madhya P	0	1	49
Maharastra	3	1	31
Manipur	2	1	6
Meghalay	2	1	4
Mizoram	0	1	7
Orissa	0	1	29

Difference statistically insignificant (P>0.05)

IFA during pregnancy
Concordant Districts

No. of Districts (64, 11%)			
Districts of….	Positive Concordance	Negative Concordance	Discordant
Rajasthan	8	0	25
Tamil Nadu	2	9	20
Uttar Pr	1	3	67
Uttarakhand	0	1	12
Total (64, 11%)	**29**	**35**	365

Difference statistically insignificant (P>0.05)

IUD insertions
Concordant States

STATES (26, 96%)	DLHS3	HMIS	Difference
Sikkim	6.7	1.04	5.66
Manipur	5	0.71	4.29
J&K	4.6	0.71	3.89
Mizoram	3.9	1.02	2.88
Punjab	5.7	4.23	1.47
Kerala	1.8	0.67	1.13
Assam	1.4	0.52	0.88
Tripura	1	0.35	0.65
Meghalaya	0.9	0.41	0.49
West Bengal	0.7	0.39	0.31
Himachal	1.3	1.43	-0.13
Tamilnadu	1.8	1.95	-0.15
Karnataka	1.7	1.85	-0.15
Gujarat	3.2	4.14	-0.94
Orissa	0.4	1.4	-1

IUD insertions
Concordant States

STATES (26, 96%)	DLHS3	HMIS	Difference
Chhattisgarh	0.6	2.07	-1.47
AndhraPradesh	0.3	1.96	-1.66
UP	1	3.86	-2.86
Uttarakhand	1	4.41	-3.41
Bihar	0.4	0.87	-0.47
MP	0.5	2.91	-2.41
Arunachal	3.3	0.76	2.54
Haryana	3.5	3.41	0.09
Rajasthan	1.3	2.71	-1.41
Jharkhand	0.5	1.31	-0.81
Maharashtra	1.5	1.7	-0.2

IUD insertions
Concordant Districts

No. of Districts (560, 95%)			
Districts of....	Positive Concordance	Negative Concordance	Discordant
Andhra Pradesh	0	23	0
Arunachal Pradesh	11	2	3
ASSAM	20	2	5
Bihar	10	27	1
Chhattisgarh	0	16	0
Gujarat	7	18	1
Haryana	12	8	0
Himachal Pradesh	5	7	0
J&K State	12	2	8
Jharkhand	5	13	4
Karnataka	14	13	0
Kerala	14	0	0
Madhya Pradesh	0	45	5

IUD insertions
Concordant Districts

No. of Districts (560, 95%)			
Districts of….	Positive Concordance	Negative Concordance	Discordant
Maharashtra	16	19	0
Manipur	9	0	0
Meghalay	6	1	0
Mizoram	8	0	0
Orissa	3	27	0
Punjab	12	5	3
Rajasthan	3	29	1
Sikkim	4	0	0
Tamil Nadu	13	16	2
TRIPURA	4	0	0
Uttar Pr	2	68	1
Uttarakhand	0	13	0
West Bengal	12	4	3

Condoms
Concordant States

STATES (25, 93%)	DLHS3	HMIS	Difference
Uttarakhand	10.1	3.55	6.55
J&K	5.6	0.83	4.77
UP	6.7	2.21	4.49
Haryana	9.8	5.43	4.37
Himachal	10	6.05	3.95
Manipur	2.9	0.41	2.49
Kerala	3.7	1.22	2.48
Arunachal	2.6	0.18	2.42
Maharashtra	4.4	2.36	2.04
Assam	2.2	0.64	1.56
Meghalaya	2.1	0.57	1.53
Sikkim	3.9	2.46	1.44
Tripura	2	0.98	1.02
Bihar	1.3	0.32	0.98

Condoms
Concordant States

STATES (25, 93%)	DLHS3	HMIS	Difference
TamilNadu	1.4	0.95	0.45
Karnataka	1.2	1.73	-0.53
Jharkhand	1.9	2.44	-0.54
Mizoram	1.1	1.77	-0.67
Orissa	1.7	2.56	-0.86
Gujarat	4.1	6.01	-1.91
Chhattisgarh	1.5	3.51	-2.01
MP	4.2	6.63	-2.43
Rajasthan	7.7	11.1	-3.4
AndhraPradesh	0.4	4.06	-3.66

Condoms
Concordant Districts

No. of Districts (520, 90%)			
Districts of….	Positive Concordance	Negative Concordance	Discordant
Andhra Pradesh	0	23	0
Arunachal Pradesh	13	0	3
ASSAM	20	2	5
Bihar	35	2	1
Chhattisgarh	7	9	0
Gujarat	8	17	1
Haryana	16	1	3
Himachal	10	2	0
J&K State	11	2	9
Jharkhand	8	10	4
Karnataka	10	17	0
Kerala	14	0	0
Madhya P	15	27	8

Condoms
Concordant Districts

No. of Districts (520, 90%)			
Districts of….	Positive Concordance	Negative Concordance	Discordant
Maharashtra	32	2	1
Manipur	9	0	0
Meghalay	5	2	0
Mizoram	2	6	0
Orissa	6	24	0
Punjab	6	0	14
Rajasthan	4	26	3
Sikkim	3	1	0
Tamil Nadu	24	6	1
TRIPURA	4	0	0
Uttar Pr	57	4	10
Uttarakhand	10	0	3
West Bengal	13	4	2

Oral contraceptive pills
Concordant States

STATES (22, 81%)	DLHS3	HMIS	Difference
Mizoram	9.6	2.56	7.04
Orissa	8	1.8	6.2
Manipur	4.5	0.32	4.18
Meghalaya	4	0.77	3.23
J&K	3.4	0.45	2.95
Punjab	3.4	1.47	1.93
Arunachal	8.7	7.05	1.65
Jharkhand	2.9	1.26	1.64
Uttarakhand	3.3	2.1	1.2
Himachal	2.8	1.74	1.06
Maharashtra	1.9	1.18	0.72
Bihar	0.9	0.22	0.68
Gujarat	2.5	1.93	0.57

Oral contraceptive pills
Concordant States

STATES (22, 81%)	DLHS3	HMIS	Difference
Haryana	2.1	1.58	0.52
Kerala	0.4	0.25	0.15
Karnataka	0.8	1.13	-0.33
UP	1.3	1.64	-0.34
TamilNadu	0.1	0.51	-0.41
Chhattisgarh	1.5	2.07	-0.57
MP	1.7	3.07	-1.37
AndhraPradesh	0.2	1.78	-1.58
Rajasthan	2.7	5.75	-3.05

Oral contraceptive pills
Concordant Districts

No. of Districts (524, 89%)			
Districts of….	Positive Concordance	Negative Concordance	Discordant
Andhra Pradesh	0	23	0
Arunachal Pradesh	8	0	8
ASSAM	9	0	18
Bihar	34	3	1
Chhattisgarh	8	8	0
Gujarat	20	5	1
Haryana	17	3	0
Himachal	10	2	0
J&K State	12	2	8
Jharkhand	16	2	4
Karnataka	10	17	0
Kerala	10	4	0
Madhya P	12	33	5

Oral contraceptive pills
Concordant Districts

No. of Districts (524, 89%)			
Districts of….	Positive Concordance	Negative Concordance	Discordant
Maharashtra	26	9	0
Manipur	9	0	0
Meghalaya	6	1	0
Mizoram	8	0	0
Orissa	28	0	2
Punjab	17	0	3
Rajasthan	1	30	2
Tamil Nadu	1	28	2
Uttar Pr	26	44	1
Uttarakhand	9	4	0
West Bengal	9	0	10
TOTAL (524, 89%)	218	306	65

Emergency contraceptive pills
Concordant States

STATES (26, 96%)	DLHS3	HMIS	Difference
Meghalaya	0.9	0	0.9
Arunachal	0.6	0	0.6
Mizoram	0.6	0.02	0.58
J&K	0.6	0.03	0.57
Assam	0.6	0.03	0.57
Haryana	0.5	0	0.5
Uttarakhand	0.5	0.02	0.48
Manipur	0.4	0.01	0.39
UP	0.3	0	0.3
Himachal	0.3	0.01	0.29
Jharkhand	0.3	0.01	0.29
Rajasthan	0.3	0.02	0.28
Punjab	0.3	0.02	0.28
Orissa	0.2	0.01	0.19

Emergency contraceptive pills
Concordant States

STATES (26, 96%)	DLHS3	HMIS	Difference
Gujarat	0.2	0.03	0.17
Sikkim	0.2	0.04	0.16
Bihar	0.1	0	0.1
Tamilnadu	0.1	0.01	0.09
Chhattisgarh	0.1	0.01	0.09
West Bengal	0.1	0.01	0.09
Tripura	0.1	0.01	0.09
Karnataka	0.1	0.02	0.08
AndhraPradesh	0.1	0.02	0.08
MP	0.1	0.03	0.07
Kerala	0	0	0
Maharashtra	0.2	1.18	-0.98

Emergency contraceptive pills
Concordant Districts

No. of Districts (561, 95%)			
Districts of….	Positive Concordance	Negative Concordance	Discordant
ANDRA PR	20	3	0
Arunachal Pradesh	13	0	3
ASSAM	21	1	5
Bihar	29	8	1
Chhattisgarh	16	0	0
Gujarat	19	6	1
Haryana	20	0	0
Himachal	11	1	0
J&K State	13	1	8
Jharkhand	17	1	4
Karnataka	20	7	0
Kerala	10	4	0
Madhya P	41	4	5

Emergency contraceptive pills
Concordant Districts

No. of Districts (561, 95%)			
Districts of….	Positive Concordance	Negative Concordance	Discordant
Maharashtra	27	8	0
Manipur	9	0	0
Meghalaya	7	0	0
Mizoram	7	1	0
Orissa	25	5	0
Punjab	17	0	3
Rajasthan	30	2	1
Sikkim	3	1	0
Tamil Nadu	25	4	2
TRIPURA	3	1	0
Uttar Pr	70	0	1
Uttarakhand	12	1	0
West Bengal	16	1	2
TOTAL (561, 95%)	**501**	**60**	**36**

Sterilization-Male
Concordant States

STATES (26, 96%)	DLHS3	HMIS	Difference
Uttarakhand	2.4	0.13	2.27
J&K	1.5	0.05	1.45
UP	0.2	0.03	0.17
Haryana	1.2	0.17	1.03
Himachal	7.8	0.19	7.61
Manipur	0.4	0.02	0.38
Kerala	0.8	0.04	0.76
Arunachal	0.5	0	0.5
Maharashtra	2.9	0.16	2.74
Meghalaya	0.1	0	0.1
Bihar	0.4	0.17	0.23
West Bengal	0.5	0.16	0.34
Tamilnadu	0.3	0.01	0.29

Sterilization-Male
Concordant States

STATES (26, 96%)	DLHS3	HMIS	Difference
Tripura	0.2	0.07	0.13
Sikkim	5.3	0.09	5.21
Assam	0.2	0.2	0
Punjab	0.7	0.17	0.53
AndhraPradesh	4.1	0.11	3.99
Karnataka	0.2	0.09	0.11
Jharkhand	0.4	0.11	0.29
Rajasthan	0.6	0.06	0.54
MP	1	0.12	0.88
Gujarat	1.9	0.07	1.83
Chhattisgarh	2.3	0.17	2.13

Sterilization-Male
Concordant Districts

No. of Districts (550, 93%)			
Districts of....	Positive Concordance	Negative Concordance	Discordant
ANDRA PR	20	0	3
Arunachal Prade	13	0	3
ASSAM	9	13	5
Bihar	26	11	1
Chhattisgarh	16	0	0
Gujarat	23	1	2
Haryana	20	0	0
Himachal	8	0	4
J&K State	14	0	8
Jharkhand	17	1	4
Karnataka	19	8	0
Kerala	13	1	0
Madhya P	41	4	5

Sterilization-Male
Concordant Districts

No. of Districts (550, 93%)			
Districts of….	Positive Concordance	Negative Concordance	Discordant
Maharashtra	31	1	3
Manipur	9	0	0
Meghalaya	6	1	0
Mizoram	7	1	0
Orissa	29	1	0
Punjab	14	3	3
Rajasthan	29	3	1
Sikkim	4	0	0
Tamil Nadu	23	6	2
TRIPURA	3	1	0
Uttar Pr	64	6	1
Uttarakhand	13	0	0
West Bengal	15	2	2
TOTAL (550, 93%)	**486**	**64**	**47**

Sterilization-Female

Concordant States

STATES (2, 7%)	DLHS3	HMIS	Difference
Manipur	6	0.11	5.89
Meghalaya	8.6	0.29	8.31

Concordant Districts

No. of Districts (40, 7%)			
Districts of….	Positive Concordance	Negative Concordance	Discordant
ASSAM	13		14
Manipur	9		0
Meghalay	4		3
Uttar Pr	14		57
TOTAL (40, 7%)	40	0	74

HIV Test-Female
Concordant States

STATES (18, 67%)	DLHS3	HMIS	Difference
Himachal	5.8	0.03	5.77
J&K	5.8	0.44	5.36
Arunachal	7.6	3.01	4.59
Haryana	5.1	2.05	3.05
Sikkim	5.3	2.38	2.92
Orissa	2.8	0.16	2.64
Punjab	4.3	1.9	2.4
Mizoram	8.9	6.61	2.29
Bihar	2.4	0.28	2.12
UP	2.1	0.36	1.74
Chhattisgarh	2.4	0.81	1.59
Uttarakhand	2.7	1.58	1.12
Assam	0.9	0	0.9

HIV Test-Female
Concordant States

STATES (18, 67%)	DLHS3	HMIS	Difference
MP	1.9	1.04	0.86
Rajasthan	0.8	0.01	0.79
Jharkhand	1.4	0.7	0.7
Tripura	0.9	0.97	-0.07
Meghalaya	0.7	1.72	-1.02

HIV Test-Female
Concordant Districts

No. of Districts (394, 67%)			
Districts of….	Positive Concordance	Negative Concordance	Discordant
Arunachal Prade	9	3	4
ASSAM	22	0	5
Bihar	37	0	1
Chhattisgarh	16	0	0
Gujarat	0	1	25
Haryana	20	0	0
Himachal	12	0	0
J&K State	12	1	9
Jharkhand	13	5	4
Kerala	4	0	10
Madhya P	30	15	5
Maharastra	2	0	33

HIV Test-Female
Concordant Districts

No. of Districts (394, 67%)			
Districts of….	Positive Concordance	Negative Concordance	Discordant
Manipur	1	0	8
Meghalay	3	4	0
Mizoram	6	2	0
Orissa	28	2	0
Punjab	14	3	3
Rajasthan	28	4	1
Sikkim	3	1	0
Tamil Nadu	6	0	25
TRIPURA	1	3	0
Uttar Pr	65	5	1
Uttarakhand	11	2	0
TOTAL (394, 67%)	343	51	134

Postnatal complications attended
Concordant States

STATES	DLHS3	HMIS	Difference
Bokaro	44.6	41.36	3.24
Faridkot	7.9	0	7.9

RTI/STI
Concordant States/Districts

Districts of…	DLHS3	HMIS	Difference
Orissa (Nabarangapur)	3.3	0.29	3.01
Orissa (Kandhamal)	11.1	1.16	9.94
Mizoram	9	1.16	7.84
Madhya Pradesh	10.5	0.52	9.98
Jharkhand	9.5	0.31	9.19
Arunachal Pradesh	6.1	1.5	4.6

In summary

INDICATORS	CONCORDANT STATES	CONCORDANT DIST.	+veLY CONCORDANT States, Dist.	P>0.05 DIFFERENCE (DIST.)
ANC	44%	35%	58%, 50%	51%
Home deleveries	15%	19%	100%, 78%	14%
Home deleveries SBA	78%	70%	29%, 50%	13%
Newborn	26%	12%	60%, 36%	53%
IFA	15%	11%	25%, 45%	65%
IUD	96%	95%	38%, 36%	NA
Condoms	93%	90%	60%, 65%	NA
OCP	81%	89%	68%, 42%	NA
ECP	96%	95%	99%, 89%	NA
Sterilization-M	96%	93%	100%, 88%	NA
Sterilization-F	7%	7%	100%, 100%	0%
HIV	67%	67%	99%, 87%	<1%
PNC	<1%	<1%	NA	NA
RTI	<1%	<1%	NA	NA

*NA=Not Applicable. Eligible number of districts was so small that meaningful analysis was not feasible.

- Difference between 2 data sets was minimal.

- Half of the indicators were concordant in more than 60% States/Districts in the country.

- Positive concordance (DLHS data higher than HMIS) was observed more (*contradictory to popular belief*).

- Differences in DLHS and HMIS data were statistically insignificant (*indicating role of chance*).

- Notable, were indicators which were comparable in more than 90% districts in the country, clearly showing that DLHS & HMIS data are similar.

- DLHS & HMIS data are comparable and differences are understandable in view of underlying differences between 2 datasets.

Recommendations

- Comparable definitions

- Comparable time periods

- Program data (with methodology description) on public domain

- Standardized methodology (cut-offs 10%??)

- Standardized statistical analysis (Kappa statistics)

- Guidelines to improve data quality

Annexure1: Incomparable indicators

INDICATOR	REASON
Antenatal Care 3 check ups	In HMIS components of ANC are not clear. In DLHS they are.
Institutional deliveries & Safe deliveries	DLHS does not defines/specifies institutions/facilities. Do not know if its both private and public. HMIS lists out CHC, PHC, SC, DH, etc. HMIS does not defines private facilities/institutions. In HMIS multiple providers/facilities report which results in over-reporting.
No. of women with obstetric complications and attended to	In DLHS complications segregated by time period in HMIS they are not segregated.
Child immunization	HMIS: 9-11 months. DLHS: 12-23 months