Creation of a family planning service quality score using factor analysis

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Outline

- Objectives
- Background of quality measurement in family planning
- Data
- Factor Analysis
- Contingent market evaluation
- Implications

Objectives

- To devise a multidimensional measurement of family planning service quality, incorporating objective and subjective items elicited via survey from patients, providers and facilities.
- To determine the relative importance of resulting dimensions using the opinions of family planning experts.

Background

- Influential conceptual frameworks
  - Judith Bruce's 6 domains of FP quality
    - Choice of Methods
    - Information given to clients
    - Technical competence
    - Interpersonal relations
    - Mechanisms to encourage continuity
    - Appropriate constellation of services
  - Donabedian's 3 dimensions of quality of care
    - Structure
    - Process
    - Outcome

Information Available

- Facility Survey and Observation
  - Services provided
  - Methods available, price and supplier
  - Staff information
  - Facility appearance
- Provider Survey
  - Provider experience, affiliation and training
  - Provider dispensation and referral practices
- Client Exit Interview
  - Reason for visit, services received
  - Reason for choosing facility
  - Family planning methods discussed and chosen
  - Satisfaction and suggestions for improvement
  - Client education and wealth characteristics

Data

- Carolina Population Center-Alternative Business Models study
- 2 rounds of data collection -2001 and 2004
- 3 countries –Pakistan, Ethiopia, India
- 4 types of FP service providers:
  - Franchise
  - Private non franchise
  - Government
  - NGO

Sampling

	Pakistan	Ethiopia
Facility	PPS Systematic sample of facilities within 11 cities, stratified by size. (n=1718)	Stratified random sample in Addis Ababa; Census of facilities in 2 other regions (n=787)
Provider	All providers authorized for FP services interviewed if present (n=2670)	All providers authorized for FP services interviewed if present (n=1032)
Client	Systematic sample of 8 clients after random start (n=19798)	Systematic sample of 4 clients after random start (n=3866)

Source: Stephenson, R et al. 2004. Franchising Reproductive Health Services. Health Serv Res. 39(6 pt 2): 2053-2080.

Quality Measurement

- Inspired by Bruce's 6 dimensions of quality
- Began with 112 survey items
- Created 8 indices comprising groups of variables in the data
- Variable mean for clients, providers per facility
- Factor Analysis
- Determination of weights

Source: Bruce, J. 1990. Fundamental Elements of the Quality of Care: A Simple Framework. Studies in Family Planning,21(2):61-91.

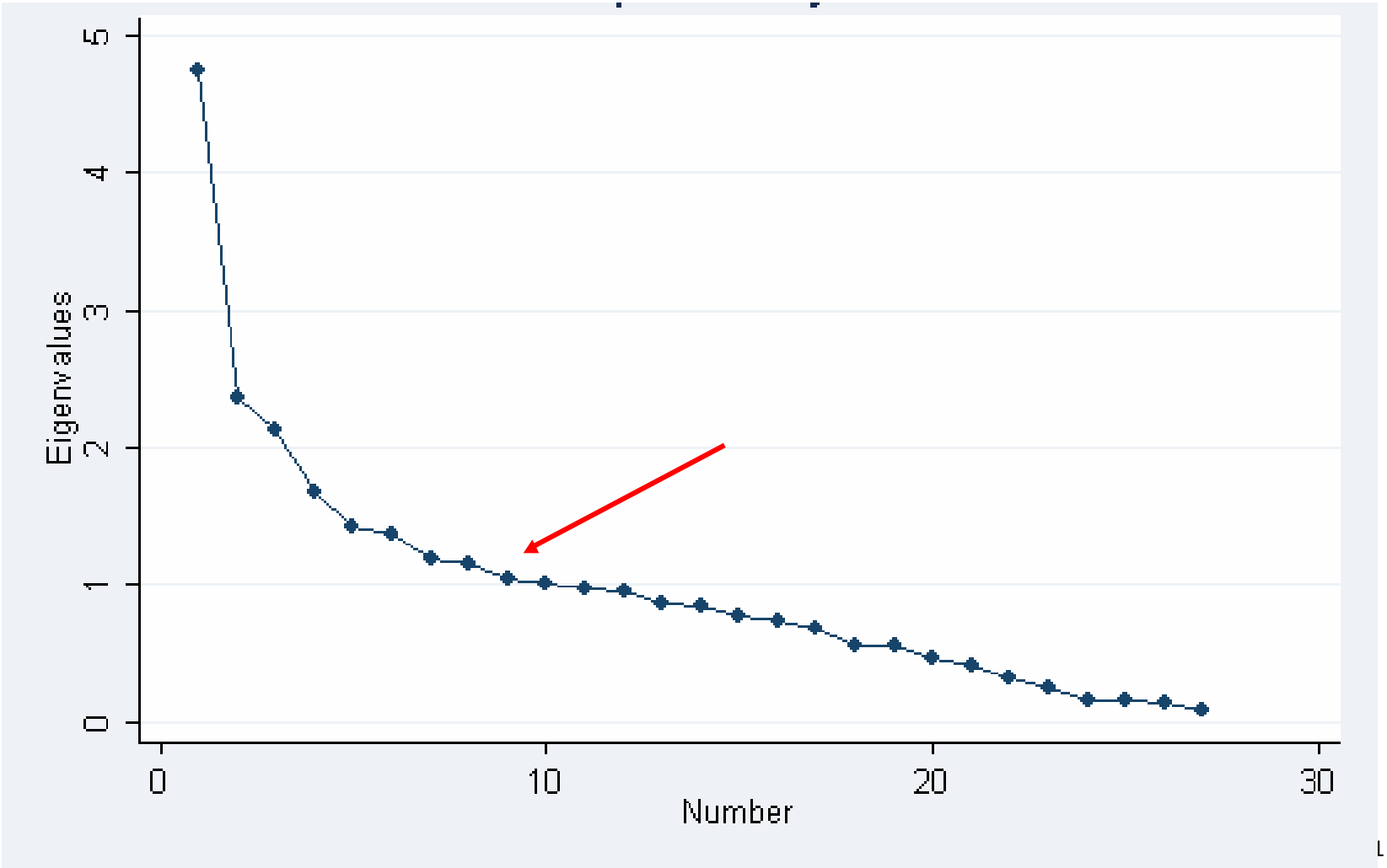
What is exploratory factor analysis?

- A method of discovering the underlying (latent) construct, for which we have related observations
- A method of data reduction
  - Went from 112 survey items to 6 dimensions
- A method of scale construction

Factor Analysis to Measure Quality

- Followed strict rules for inclusion
- Principal Components Analysis used to select initial # of factors
  - Eigenvalue >1
- ML method for factor analysis, dropping variables with high uniqueness
  - Uniqueness >0.8
- Varimax Rotation, identifying variables in each dimension
  - Factor Loading >0.4
- To form single measure of quality added up all six dimensions with weighting for each dimension

Scree Plot



Eigenvalues

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	4.75238	2.39474	0.1760	0.1760
Comp2	2.35764	.235182	0.0873	0.2633
Comp3	2.12246	.451049	0.0786	0.3419
Comp4	1.67141	.246212	0.0619	0.4038
Comp5	1.4252	.0521139	0.0528	0.4566
Comp6	1.37308	.185293	0.0509	0.5075
Comp7	1.18779	.0422864	0.0440	0.5515
Comp8	1.1455	.0995354	0.0424	0.5939
Comp9	1.04597	.0390061	0.0387	0.6326
Comp10	1.00696	.0387522	0.0373	0.6699
Comp11	.96821	.014327	0.0359	0.7058
Comp12	.953883	.0831862	0.0353	0.7411
Comp13	.870697	.0319129	0.0322	0.7734
Comp14	.838784	.0653636	0.0311	0.8044
Comp15	.773421	.0333577	0.0286	0.8331
Comp16	.740063	.0515679	0.0274	0.8605
Comp17	.688495	.12371	0.0255	0.8860
Comp18	.564785	.0114386	0.0209	0.9069
Comp19	.553347	.0959613	0.0205	0.9274
Comp20	.457385	.0483653	0.0169	0.9444
Comp21	.40902	.0929243	0.0151	0.9595
Comp22	.316096	.0756577	0.0117	0.9712
Comp23	.240438	.0742767	0.0089	0.9801
Comp24	.166161	.00640595	0.0062	0.9863
Comp25	.159755	.0262105	0.0059	0.9922
Comp26	.133545	.0560256	0.0049	0.9971
Comp27	.0775194	.	0.0029	1.0000

Uniqueness, and Iterations

Variable	Factor1	Factor2	Factor7	Factor8	Uniqueness
adeARH	0.1097	0.0802	0.0309	0.1247	0.9577
cleanfac	0.0071	0.057	0.025	0.1406	0.9383
clientimp	0.0838	0.0181	0.0878	0.8913	0.1694
clientlikes	0.1432	0.0249	-0.0139	0.3607	0.7835
fpchoice	0.1724	0.0618	0.0074	0.1116	0.2797
iecpost	0.01	0.0289	-0.0529	-0.0662	0.9872
intrain	0.0654	0.9144	-0.0123	-0.0143	0.1428

Factor Analysis Results

Variable	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Uniqueness
protalk	0.28	0.07	0.00	0.95	0.14	-0.03	0.00
fpchoice	0.17	0.06	0.00	0.77	0.16	0.01	0.35
protreat	-0.03	0.00	-0.03	0.02	-0.04	0.60	0.64
returntm	0.57	0.07	0.10	0.37	0.04	0.05	0.52
satis	-0.02	-0.04	-0.03	-0.03	-0.08	0.78	0.38
servpro	0.71	0.10	0.10	0.21	0.35	-0.03	0.31
methchoi	0.18	0.04	0.09	0.15	0.94	0.00	0.05
methstock	0.11	0.03	0.09	0.10	0.84	-0.10	0.26
otherserv	0.82	0.05	0.09	0.27	0.11	-0.04	0.24
reckeep	0.74	0.08	0.09	0.21	0.17	-0.01	0.36
intrain	0.06	0.92	0.09	0.08	0.05	0.00	0.13
traincontent	0.06	0.87	0.16	0.04	0.03	-0.04	0.21
trainday	0.10	0.54	0.14	0.07	0.03	0.01	0.67
trainabort~n	0.09	0.11	0.91	0.00	0.07	0.00	0.16
trconabort~n	0.06	0.12	0.99	0.00	0.09	-0.02	0.00

Factor Analysis Results- from items to domains

Ethiopia

- Abortion Training
- Device Methods Choice
- Information Given
- Satisfaction
- Technical Competence
- Service Range

Pakistan

- Abortion Training
- Device Methods Choice
- Information Given
- Satisfaction
- Technical Competence
- Amenities

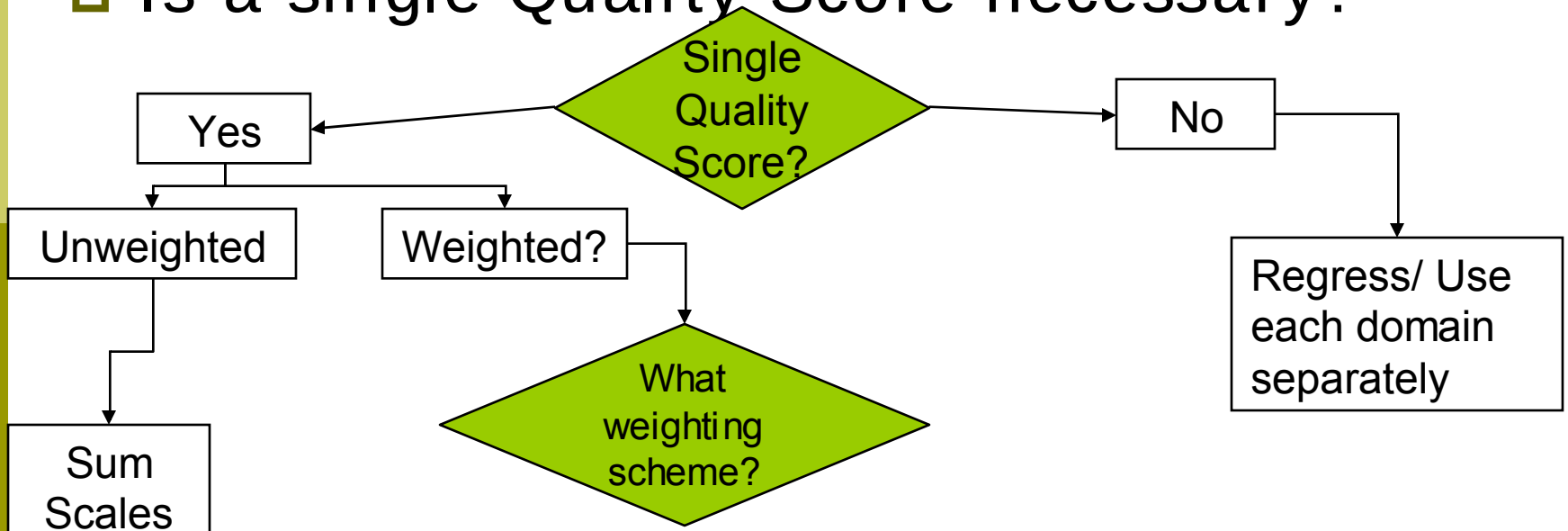
Factor Analysis Results - Reliability

Domains	Ethiopia (Cronbach's α)	Pakistan (Cronbach's α)
Technical competency in abortions	0.96	0.94
Availability of FP methods	0.90	0.95
Information given by providers	0.89	0.72
Client satisfaction	0.64	0.75
Overall technical competence in FP	0.86	0.79
Service Range / Amenities	0.82	0.79

To Weight or not to weight?

- Status quo = 6 separate domains of quality

- Is a single Quality Score necessary?

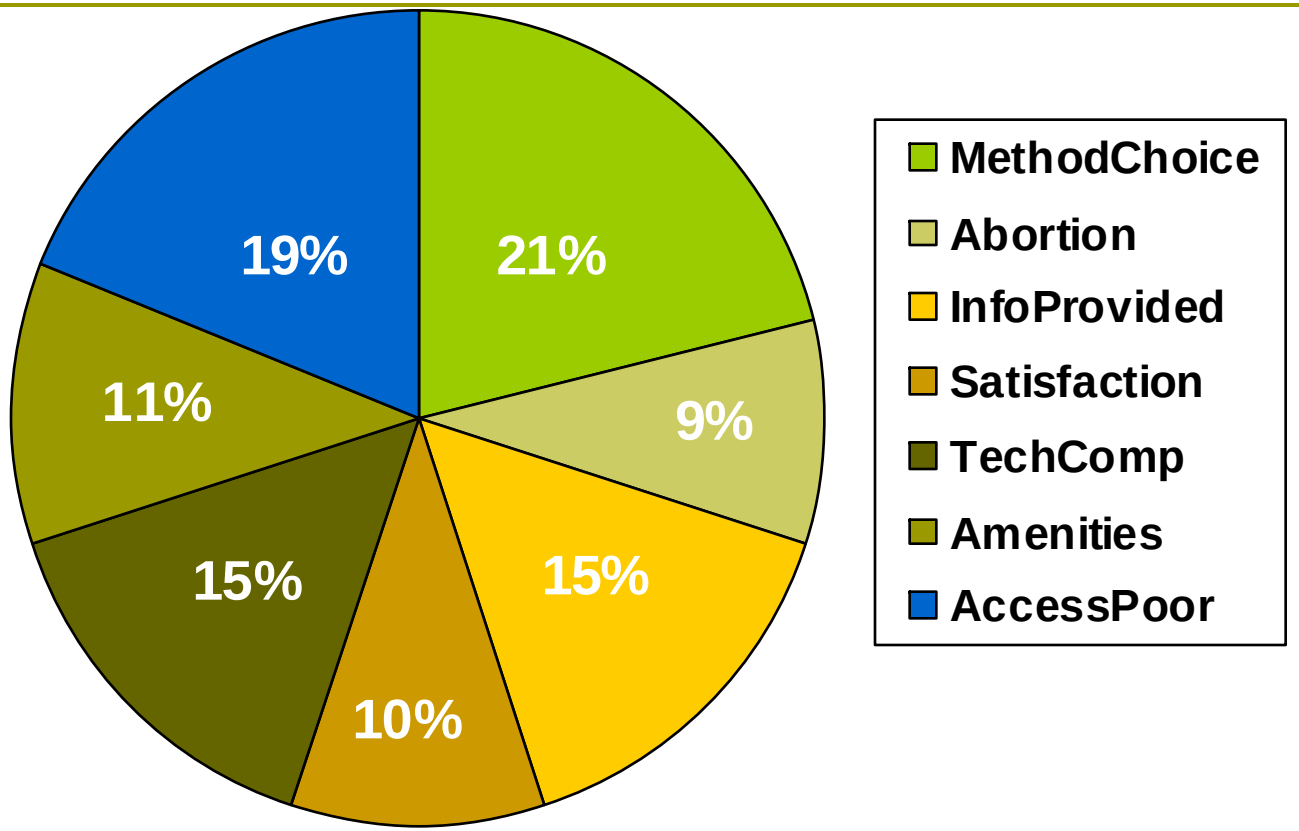


Using Experts to derive weights

- Contingent Market Evaluation Scenario
  - 30 Family Planning Experts from 14 countries
  - Each expert given $5000 in monopoly money

"You are the director of a family planning program. A self study has just been completed and found that the quality of services in your clinic has scored a 5 out of 10 (with 10=best in world). There is an NGO with a proven record for improving FP service quality, and for every $1000 spent, the service quality rating will go up by 1 point. So for example, if you spend $2000 on Technical Competence, your quality rating in this area will increase to 7. Once quality is improved, it stays improved for 10 years before falling off again."

Proposed Weighting Scheme



Respondents were asked about 1 additional aspect: Importance of increasing service accessibility for the poor.

Implications

- Theory of Bruce's framework is borne out in data
- Domains of quality may be generalizable across countries – making regional comparisons possible
- An overall score may be preferred in further analyses such as equity, cost, or usage
- Domain specific scores are better for quality control and improvement, and comparison across facilities
- Factor analysis allowed for 'hands off' approach to domain determination

Thank You

Questions?