Understanding the broader context of design; the use of design ethnography in engineering global health technologies

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Engineers must understand the broader context in which a medical device will be used.

Medical device design should be based on rigorous studies that generate quantitative outcomes rather than anecdotal evidence.
Design Ethnography

Encompasses a set of tools which allows one to understand and represent the perspectives of daily life, forming a complete understanding of stakeholders’ actions, words, and thoughts.
Case I: Traditional Adult Male Circumcision (TMC), Uganda

**Problem:**
- ~70% of deaths from AIDS in sub-Saharan Africa
- Male circumcision reduces HIV risk, ~60%
- Traditional male circumcision
  - Rite of passage
  - High complication rate, 35%

**Need:** Low-cost, safe, easy-to-use, and culturally appropriate tool to increase the likelihood of safe outcomes

**Knowledge Gap:**
- Cultural and traditional significance of TMC?
- Roles, responsibilities, and training processes for cutters before, during, and after TMC?
- Cutting techniques and handling of TMC adverse events?
- Recent changes in TMC and views on how to make TMC safer?
Case I: TMC, Uganda

**Design Ethnography Methodologies:**
- >25 focus group discussions in Uganda
- >30 interviews with public health officials
- TMC observations during circumcision season

**Sample Results:**
- Cultural significance and cost were main drivers
- Cutting style varied across ethnic groups

**Design Implications:**
- Significantly changed user requirements and engineering specifications
- Importance of working with stakeholders
Traditional Male Circumcision in Uganda: A Qualitative Focus Group Discussion Analysis

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Case II: Blood Pressure (BP) Measurement, Ghana

Problem:

• Hypertensive disorders of pregnancy are major contributors to maternal mortality and morbidity
• Management depends on accurate, frequent BP measurements
• BP measurements are prone to equipment and human error

Need: Low-cost, easy-to-use method and associated device for identifying hypertension in women who are at risk for pre-eclampsia in rural low-resource settings

Knowledge Gap: What issues affect BP measurement and referral procedures in rural low-income settings?
Case II: BP Measurement, Ghana

**Design Ethnography Methodology:**
- ~75 interviews with clinicians, midwives, nurses, and CHWs
- Surveys and observations

**Sample Results:**
- CHWs in rural areas had variable BP measurement referral criteria
- Standard referral protocols were not being stringently followed

**Design Implications:**
- Innovative BP measurement methodology/device needs to incorporate features that prevent over/under-referral of patients
BRIEF COMMUNICATIONS

Discrepancies between clinicians and rural healthcare workers regarding referral procedures based on blood pressure measurements

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Take away

Oftentimes the data needed to support medical device design process decisions don’t exist

Engineers/designers need to play an active role in gathering the information to inform design decisions versus relying on anecdotal evidence or making assumptions