Comparing paper-based survey methods with digital pen technology for conducting rapid needs assessments

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Division of Public Health & Community Services
Disclaimer

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BACKGROUND
CASPER

• Rapid Needs Assessments (RNAs)
  – Face-to-face interviews conducted in randomly selected households during disasters and emergencies

• Community Assessment for Public Health Emergency Response (CASPER)
  – Toolkit released by the CDC in 2009
  – Pulls together various methodologies and tools for RNAs and compiled them into one manual
  – Example: Galveston, TX following Hurricane Ike
Community Health Assessments

• Process for obtaining information regarding the health status of the community

• Collect primary and secondary data

• Engages stakeholders and community partners

• Required for local health department accreditation
Nashua, NH

Population = ~86,000

31 Square Miles

17 Census Tracts
Objective

To compare a paper-based survey system to a digital pen and paper method while conducting a rapid needs assessment in a timely, low cost and efficient manner for a Community Health Assessment for the City of Nashua, NH.
METHODS
Methods

• Utilized the CASPER methodology; multi-staged cluster sampling technique

• Identified 30 random clusters x 7 random interviews per cluster = 210 surveys
  – Census block groups

• Clusters are selected with probability proportionate to the estimated number of housing units
Methods

• 13 teams used the digital pens and 3 teams used normal paper and pens
• Volunteers filled out an evaluation form after using the digital pens
• Developed a 34 question health survey
• Developed an answer sheet to capture answers
• Maps developed using Esri’s ArcGIS with a pre-determined random walking path for the teams to follow in the field
Basic Data Collection for Surveys

• Teams collect info on paper using normal pens
• Data sheets are collected
• Data is entered into a database
• Data undergoes a QA process & analysis
• Results are tallied for the final report
Digital Pen Approach

- Capturx is an MS Excel add-in which enables digital pen data collection
- Teams use the answer sheet that was created with Excel
- Capturx generates a barcode-like digital watermark during printing
- Teams use the digital pens on the digital paper
- Digital pens record the handwriting by scanning the unique barcodes
- Pens are connected to the PC and the data is integrated into Excel based on the barcodes
- Can access the original handwriting, converted data and summary data tables in Excel
Community Health Survey 2010 - Answer Sheet

Date (mm/dd/yy) 11-6-10
Study ID # 239
Interviewers Victoria, Ashley

General Questions:
Willing to Participate Y/N Y
Over the age of 18 Y/N Y
Live in Nashua Y/N Y

Question 1 3 1
Question 2 Nutrition
Question 3 1 3
Question 4 1 4
Question 5 0 5

Question 19F 2 19F
Question 19G 2 19G
Question 19H 2 19H
Question 19I 2 19I
Question 20 4 20
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Question 23 1 23
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Question 25 1 25
## Community Health Survey 2010 - Answer Sheet

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### General Questions:

- Willing to Participate: Y/N
- Over the age of 18: Y/N
- Live in Nashua: Y/N

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### Summary Data

- Summarizes all data into one worksheet
- Can export and manipulate like other Excel spreadsheets
- Can import into Epi-Info

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Basic Data Collection for Mapping

- Teams collect info on printed maps using normal pens
- Maps are collected
Digital Pens for Mapping Process

- Capturx has an add-on for Esri’s ArcGIS
- Capturx generates a barcode-like digital watermark during printing
- Teams use the digital pens on the digital paper
- Icons and objects can be linked to the map legend
- Freehand map notes and markups
- Pens are connected to the PC and the data is integrated into ArcGIS based on the barcodes
- Electronic record of map and map notes
EXAMPLE ONLY

Can view original handwriting and converted graphics
RESULTS
Results

• Volunteers were easily trained
• Tracking of the households and integration into ArcGIS was useful
• Reduced amount of time needed for data entry
• Minimized data entry errors
  – With the digital pens there were ~3 errors per page, mostly due to poor handwriting
• Have electronic form with original handwriting and converted text and original document
• Reduced costs for staff time with data entry
Volunteer Feedback

• How would you rate your experience with the digital pens?
  – Excellent  19%
  – Good       52%
  – Fair       23%
  – Poor       5%

• “No challenges with the pen”
• “Took some time to develop routine for remembering to touch the icon before and after use”
Advantages

**Paper**
- Low cost
- Easy to use in the field
- No power source needed
- Familiar to volunteers

**Digital Pens**
- No data entry required
- Training is minimal and easy for volunteers to use
- Lightweight and easy to store
- SharePoint allows data transfer while in the field – timely data
- Mapping feature
- Need limited IT support
- Waterproof ink
Disadvantages

**Paper**

- Need to enter data manually; may cause errors
- Paper is subject to the weather
- Time required to enter data can be extensive
- Need QA to ensure data was transferred correctly
- Need to make copies of paper forms

**Digital Pens**

- May be expensive to start-up
  - Need one pen per team
- Need to train volunteers
- Requires a power source to charge pens
- Need to make copies of the paper form with digital watermark
- Need QA to ensure data was transferred correctly
- Need decent handwriting
Limitations

• Did not quantify how long it took to enter the data and do a QA process for paper based and digital pens and paper
Conclusion

• Using Capturx software and digital pens, survey data was automated without changing the paper-based process or having an extensive training for volunteers.

• Proved to be an effective and cost-efficient method to conduct the survey.
Next Steps

- Using the Capturx software and digital pens for use in:
  - Points of Dispensing Sites (PODs)
  - Alternate Care Sites (ACS)
  - Triage Centers
  - Shelter Surveillance
  - Flu Clinics
- Pre-develop answer sheets and surveys for use following a disaster
Acknowledgements

• City of Nashua, NH, DPHCS
  – Victoria Alabi
  – Meredith Lyons
• City of Nashua, NH, Assessing Department
  – Angelo Marino
• Southern NH Medical Center
• St. Joseph Hospital
• Nashua Area Health Center
• NH Department of Health & Human Services
• Health Survey Subcommittee
• Health Survey Volunteers
• Residents that completed the survey
• Adapx
Questions?

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City of Nashua, NH, Division of Public Health &
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CDC CASPER TOOLKIT:
http://emergency.cdc.gov/disasters/surveillance/