

Comparison of web based online registration of births, deaths, and migration with home visits in Chakaria, Bangladesh

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Background

Paper-based data collection involving face to face interview requires significant amount of time and money for maintaining health and demographic surveillance system in developing countries.

Development of web based online data collection has the potential replacing face to face interview reducing time and cost. Thus it is important to test the feasibility of the online data collection and evaluate the quality of data and cost.

Background cont...

This paper reports findings from a study which compared web based online data collection systems with face to face interview in Chakaria, a rural area of Bangladesh, as a part of ongoing health and demographic surveillance system.

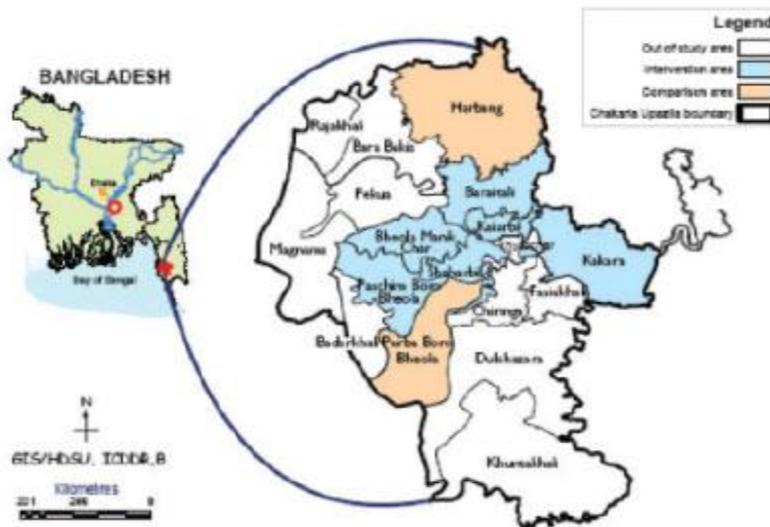
Objective

To compare face-to-face interview in paper based system and web based integrated HDSS system in terms of data collection, data management, quality of data, accuracy and consistency of data, use of data and cost of data.

METHODS AND MATERIALS

Study population and study area:

Chakaria Health and Demographic Surveillance System (CHDSS), located on the south-eastern coast of the Bay of Bengal. The CHDSS covers Eight unions, 49 villages, around 90,000 residents living in 15,100 households.



METHODS AND MATERIALS

Data Collection:

The HDSS web-based software application has been designed and developed three tier architecture using J2EE platform. Surveillance workers are collecting and updating health and demographic events quarterly using TAB devices.

Data on socio-demographic and health indicators including birth, death, migration, split/merge, marriage, maternal health, education, and employment are recorded through quarterly household visits.

METHODS AND MATERIALS

Data Collection contd..

Sixteen tabs(Smartphone) are connected with mobile internet through mobile operator network. Each surveillance worker collects data using this device and data stores directly into central database server.

The field supervisor check the stored data and report to data manager if anything need to modify. Data manager modify the data accordingly. In some cases he/she can't edit some data due to limitation of his/her access permission. In that case data manager report to the Application team of IT(Information Technology), application team modify the data accordingly.

METHODS AND MATERIALS

Data collection contd..:

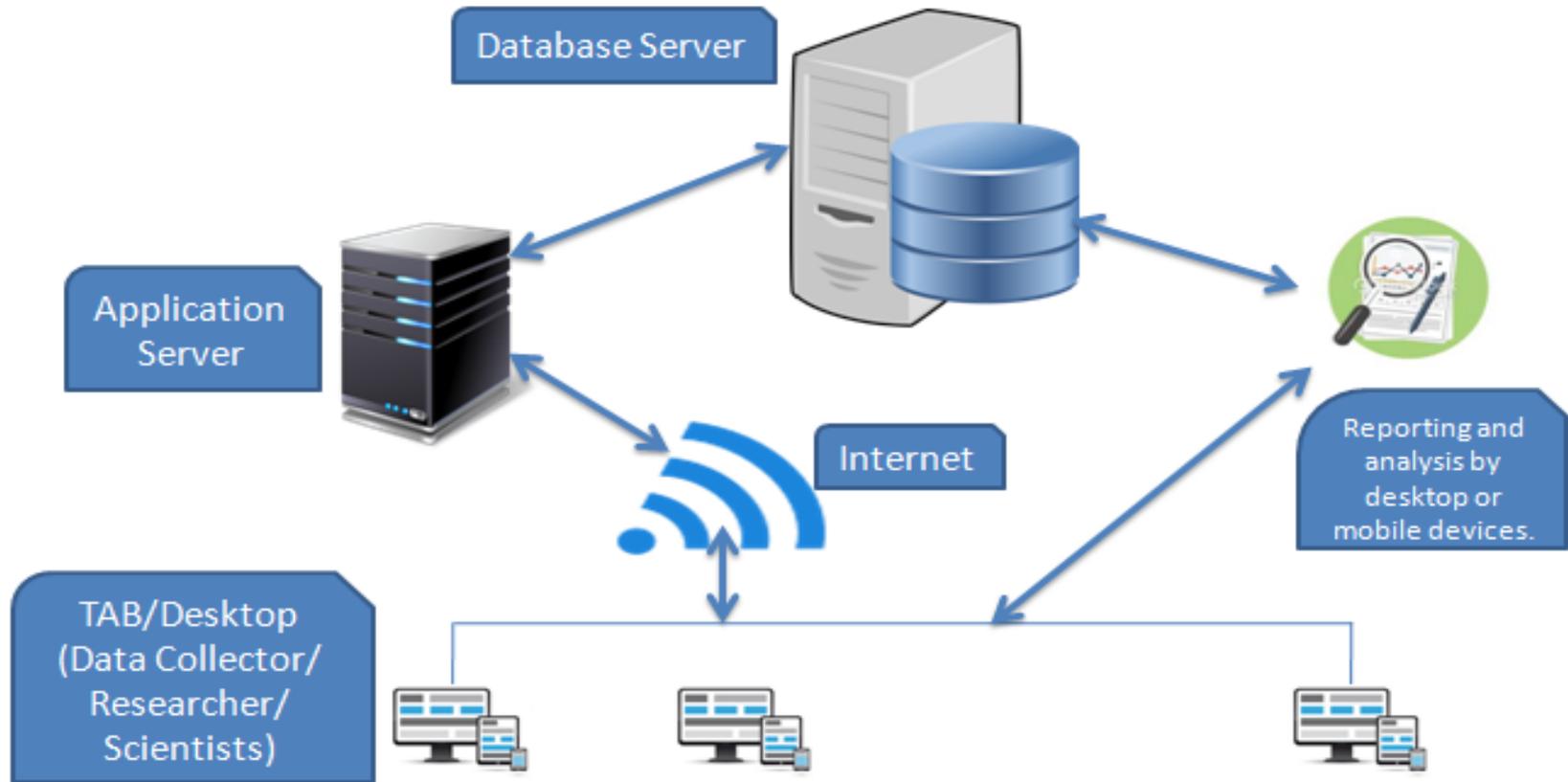
During October-December, 2014 , health and demographic data were collected from 18601 households through paper-based methods and January-March, 2015 data were collected from 19001 households through web-based. The volume of information for these vital events remained same for both modes of data collection.

Data analysis

Salary of data collectors and data management staff, cost of paper, printing cost, and time of data collection was compared between two methods.

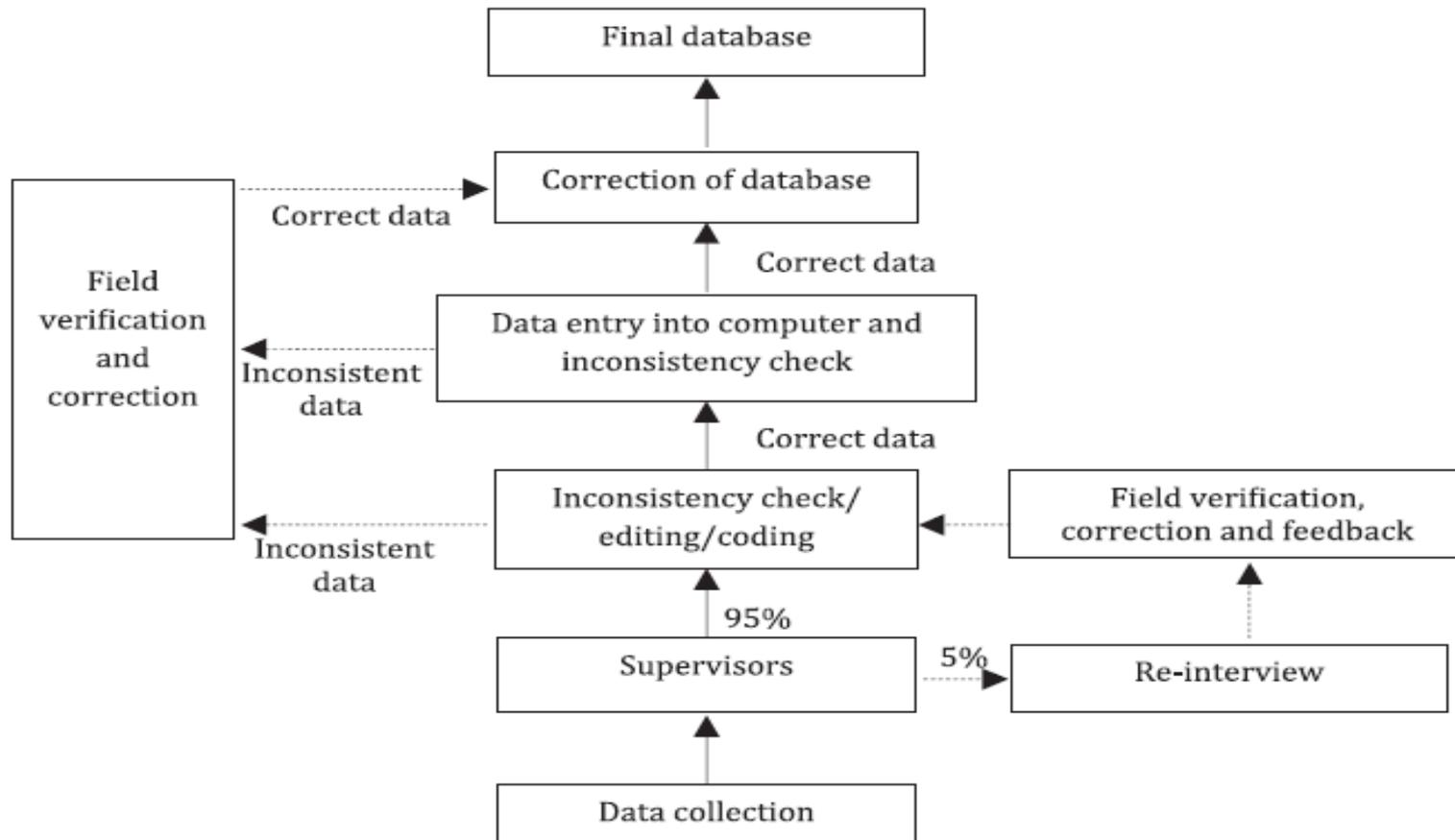
METHODS AND MATERIALS

Data flow diagram in web-based data collection:



METHODS AND MATERIALS

Data flow in Paper based system:



METHODS AND MATERIALS

Major advantages in Web based HDSS:

- Simple and more readable
- Significantly reduced wrong data entry
- Pop-up instruction and skip pattern
- Integrated static and dynamic validation
- Time & cost reduced significantly for data editing & checking.
- Delay of data collection between two round has been resolved
- Data can view in real time.
- Report generation and analysis primary data is very easy for researches and scientist.
- Data accuracy and consistency has been improved
- There is no risk to lost/damaged of collected data like paper.

Results

Characteristics of data collectors :

The mean age of data collectors was 23 years (min 19 and max 33) having at least higher secondary level education. The average experience in surveillance data collection is 5 years. These characteristics were similar for both mode of data collection.

Characteristics of respondents

Majority (95%) of the respondents were females. The median age of the respondent was 35 years. About 90% of respondents were 20 years old. One-third of the respondent has never been to school. (Table 1).

Results

Table 1 . Characteristics of respondent

| Characteristics | % |
|-----------------|------|
| Sex | |
| Male | 5.1 |
| Female | 94.9 |
| Age(years) | |
| <20 | 11.1 |
| 20-39 | 53.9 |
| 40 and above | 35.0 |
| Occupation | |
| House wife | 73.7 |
| Others | 26.3 |
| Education | |
| None | 32 |
| 1-5 class | 24.1 |
| 6+ class | 43.9 |

Results

Data collection time and cost

The number of interview was 36% lower for web-based method (16 interviews per day) compared to home visit (25 interviews per day) (Fig. 2). The average time of data collection between web-based and home-visit varied ($P < 0.001$), it was 18 (SD=4) minutes for web-based and 14 (SD=6) minutes for home visit (Fig.1).

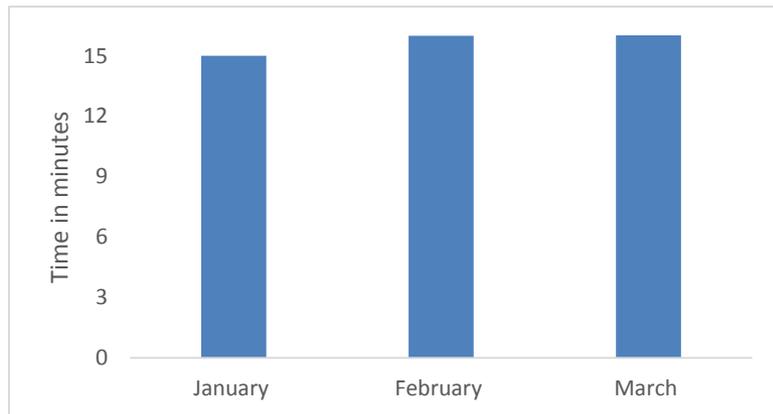


Fig . 1 Web-based data collection time per household

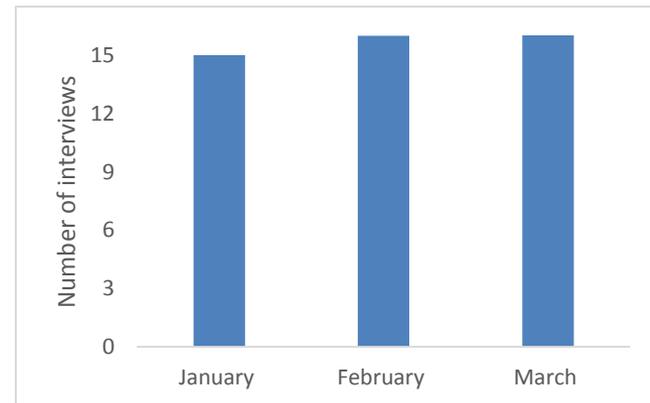


Fig . 2 Number of interview per-day

Results

Table 2 presents the cost of various items for data collection and management per household. The average cost of home visit was similar compared to the cost of carrying out a web-based. The major cost-cutting items of web-based methods includes the cost of paper, printing, and data editing/coding, data entry. On the other hand, the cost of data collectors was higher for web-based than for home visit.

| Items | Home visit(Paper based) | Web-based |
|----------------------------|-------------------------|-----------|
| Salary of data collector | 25 | 37 |
| Paper/printing | 5 | 0 |
| Data edit, code, and entry | 8 | 0 |
| Total (Taka) | 38 | 37 |
| Total (US\$) | 0.54 | .53 |

Discussion

It was difficult to manage personal identification number (ID) in paper-based system.

From birth to death, health, demographic and transitional events, such as morbidity, receiving vaccine, migration, and marriage are occurred, which can require intensive tracking.

Writing 10 digit ID is a difficult job with pen and paper correctly as a human being.

In web-based data collection using pop-up mode tracking each individual with events made easy for data collectors. Almost no chance of wrong entry of ID. Static & dynamic validation assistance help interviewer to collect data accurately.

Discussion contd..

Designing web-based system application permit answers to fall within an acceptable range. All events entered during field visits are checked for inconsistencies during this step by the system.

All data have been stored in central database and central database server is highly protected and have strong backup mechanism system has been designed for secure stored data.

Data entry and updating health and demographic events forms are very user friendly and easy to interviewers. Figure 3-5 are data entry forms in web based CHDSS. Researchers/scientist also can view real time result/graphical report(Figure 6-7) of various demographic indicators from dashboard.

Discussion contd..

Web based data entry forms.

In migration details

| | | |
|---------------------------------------|--|--|
| Is internal movement? | <input type="text" value="1-Yes"/> | |
| Migration date | <input type="text"/> |  |
| Migration reason | <input type="text" value="Please select"/> | |
| Migrated from country * | <input type="text" value="Please select"/> | |
| Migrated from district | <input type="text" value="Please select"/> | |
| Migrated from upazila | <input type="text" value="Please select"/> | |
| Migrated from union parishod | <input type="text" value="Please select"/> | |
| Migrated from village | <input type="text" value="Please select"/> | |
| Migrated from household | <input type="text" value="Please select"/> | |
| Migrated from household member | <input type="text" value="Please select"/> | |
| Member code | <input type="text"/> | <input type="button" value="Select member"/> <input type="button" value="Add member"/> |
| Member name | | |
| Member sex | | |

Figure-3: Migration entry form

Discussion contd..

Web based data entry forms.

1 Split 2 Merge 3 Asset 4 Migration In 5 Migration Out 6 Marriage Start

7 Marriage End 8 Concep. 9 Preg. Out 10 Birth 11 Vaccination 12 Hospital.

13 Education 14 Occupation 15 Relation 16 **Death** 17 Interview

Household code: 101000102 Last Visit Date: 10/02/2015
 Round no: 26

Any member death occurred during this period? Yes

Member death list during this round

| Member code | Member name | Sex | View/Edit |
|-------------|-------------|--------|---------------------------|
| 10100010011 | habiba | Female | View/Edit |

Present member list

| Member code | Member name | Sex | Birth date | Select |
|-------------|-------------|----------|------------|------------------------|
| 10100010007 | shariar | 1-Male | 15/03/1962 | Select |
| 10100010008 | hafsa | 2-Female | 22/10/1974 | Select |
| 10100010009 | raysha | 2-Female | 10/04/2000 | Select |
| 10100010010 | meherin | 2-Female | 16/05/2002 | Select |

Figure-4: Death entry form

Discussion contd..

Web based data entry forms.

Birth list during this round

| Child code | Child name | Sex | View/Edit |
|------------|------------|-----|-----------|
|------------|------------|-----|-----------|

Birth details

| | |
|---------------------------------|--|
| Child name * | <input type="text"/> |
| Sex * | <input type="text" value="Please select"/> |
| Birth date * | <input type="text"/> |
| Father code * | <input type="text" value="Please select"/> |
| Mother code * | <input type="text" value="Please select"/> |
| Pregnancy Outcome Date * | <input type="text" value="Please select"/> |
| Relation to HHH * | <input type="text" value="chd-Child"/> |
| Entry date * | <input type="text"/> |
| Religion * | <input type="text" value="Please select"/> |
| Ethnicity * | <input type="text" value="Please select"/> |
| Entry type * | <input type="text" value="bir-birth"/> |

Figure-5: Birth entry form

Discussion contd..

Web based dash board

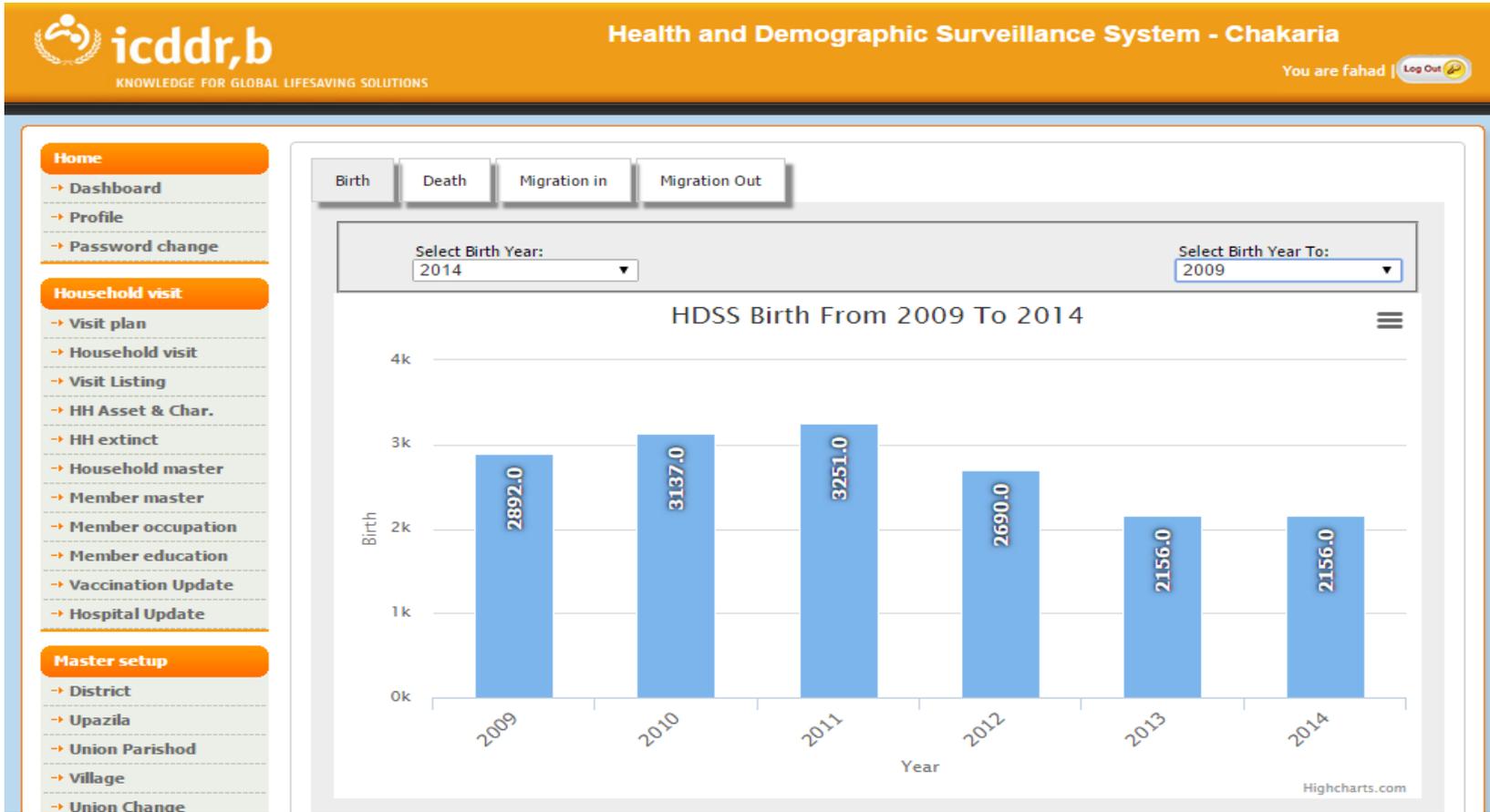


Figure-6: Birth rate report(year-wise)

Discussion contd..

Web based dash board

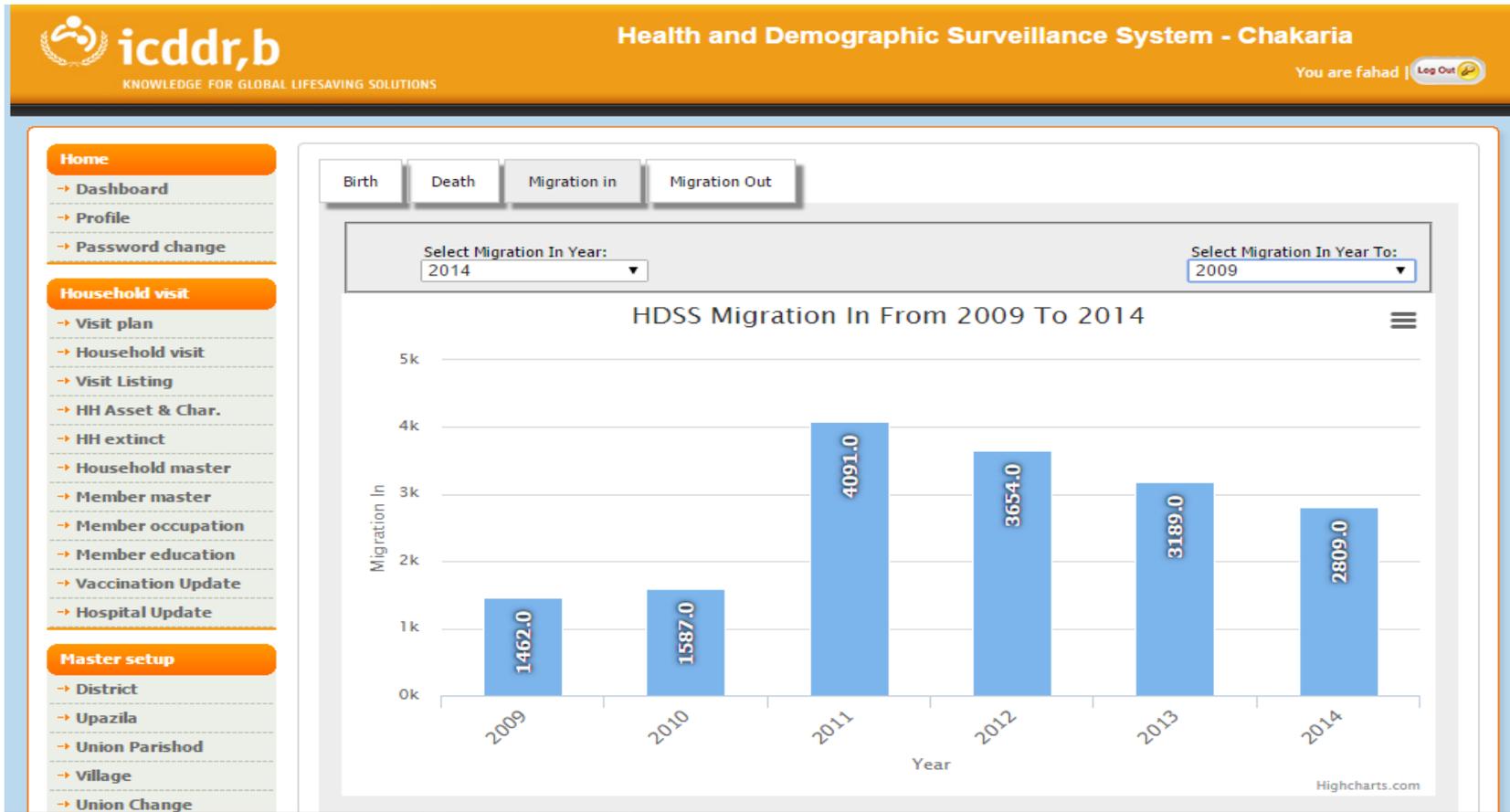


Figure-7: Migration In Report(year-wise)

Conclusion

Web-based data collection mode is a feasible and economical tool for data collection in HDSS in replace of paper-based method and other computer-aided personal interview method.

Live data collection to the key respondents and instant digitalization of the responses using computer may save time and money, ensure data quality, ease management and supervision, minimize non-responses due to absentees of the respondents in HDSS where network coverage is the prerequisite.

Moreover, compare to paper-based, web-based mode offer some additional benefits like, no risk of data loss, lower cost, friendly features, versatile use and no data uploading and downloading difficulties.

Question and Answer

I have some questions.

- *What is the study site name?*
- *What is the country of this study site?*
- *No of villages for this study site = ?*
- *No of households for this study site = ?*

Thank you very much.