

Measuring growth trajectories of children under age 5 years: A novel method for extracting anthropometric data from health cards

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Background

- The Child Health and Mortality Prevention Surveillance (CHAMPS) Network aims to address gaps in knowledge about under-5 mortality
- CHAMPS established Health and Demographic Surveillance Sites (HDSSs) across its network to help realize this aim
- Sites collect longitudinal data on a given population's size, structure, health, and mortality
- In each CHAMPS site, children often visit primary care facilities for routine vaccination and follow-up.
- During these routine visits, a child's weight is usually measured and plotted to the "Road to Health" charts
 - In routine HDSS visits, fieldworkers consult these "Road to Health" charts and transcribe information such as birth weight to HDSS forms
 - Fieldworkers may also take the photos of the "Road to Health" charts

Objective

- The primary objective of this study is to provide proof of concept of a novel data extraction method for growth trajectory data of under-five children in the CHAMPS Network

Methods

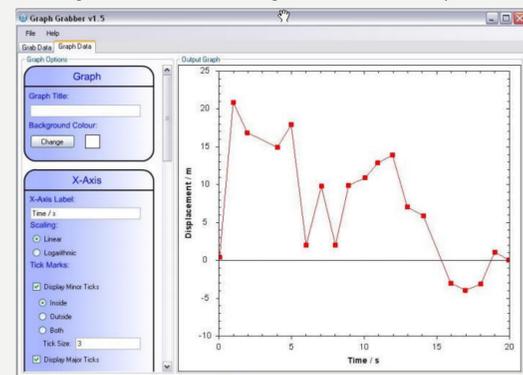
To demonstrate proof of concept, we piloted the application of Graph Grabber 2.0 technology on a sample of 12 "Road to Health" de-identified chart images from an HDSS in Manhica district, Mozambique. Graph Grabber 2.0 is a data digitization software that enables the automatic extraction of data points from graphic images; e.g., the extraction of anthropometric data (age and weight of children along a X- and Y-axis).

Advantages:

- Free
- Open-source
- User-friendly interface
- Relative ease of use

Limitation:

- Only compatible with Windows



Findings

- Graph Grabber 2.0:
 - Accurately and efficiently digitized weight and age data from pre-recorded growth charts
 - Constitutes an ideal digitization tool given:
 - Ease of user interface
 - Price
 - File and history saving capability
 - Digitized data quality dependent upon quality of original chart
- Of the 12 "Road to Health" cards examined:
 - 6 contained complete information (see Figure 2)
 - 2 were completely empty
 - 2 were missing the growth chart
 - 2 had the number and photo not matching

Figure 1: Anthropometric Digitization using Graph Grabber 2.0

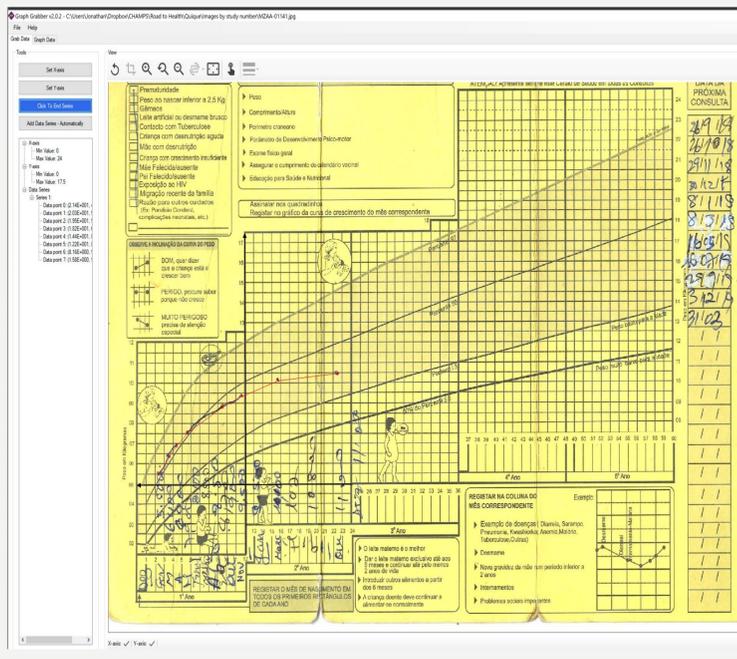
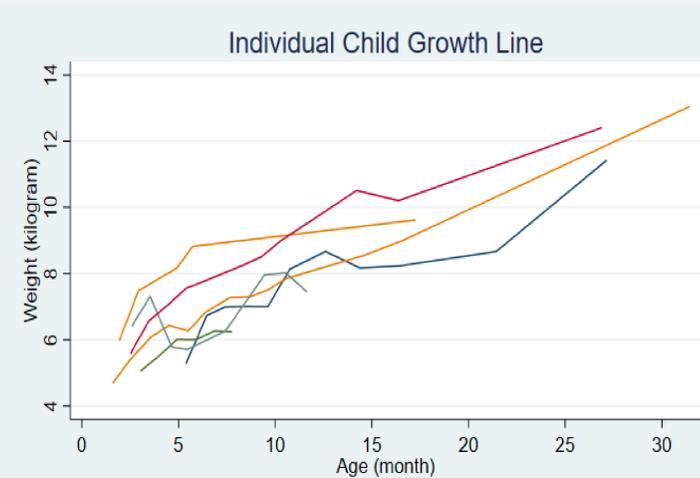


Table 2: Example Comparison of Digitized versus Manual Data Entry Record for one child

ID	Sex	Visit #	Recorded Age (Months)	Actual Age (Months)	Recorded Weight (kg)	Actual Weight (kg)
3203	M	1	5.38	5	5.27	5.3
3203	M	2	6.46	6	6.73	6.8
3203	M	3	7.41	7	6.99	7.0
3203	M	4	8.48	8	7.01	7.0
3203	M	5	9.62	9	7.00	7.0
3203	M	6	10.76	10	8.13	8.3
3203	M	7	12.60	12	8.67	8.9
3203	M	8	14.38	14	8.17	8.2
3203	M	9	16.43	16	8.23	8.2

Figure 2: Digitized Growth Trajectories Records for 6 children



Methodological Considerations

- Consistency in file type and file name
 - Some files were saved separately and recognizable by their names
 - Other files were in single pdf format with indistinguishable names
- Image quality and usability
 - Low contrast, too dark to see the graph
 - Asymmetry, tilted, folded, obscured, not well organized
 - Blank/empty chart; chart missing graph
 - Chart missing date at some points
 - Imprecise point location on the graph (in between months)

Recommendations

- Need to identify the reasons that some cards have incomplete anthropometric data or missing dates (e.g., neonatal deaths)
- Names and photos should be grouped together to avoid confusion or loss of information
- Accurately identify pin-point locations on the chart's x- and y-axis, rather than have a data point fall in between data point locations for indicators such as months
- Ideal setting to capture card image
 - Scanned photos are easier to extract than photos captured by a camera phone
 - Quality of data digitization is improved by using photos of charts taken on a flat surfaces without any bumps or tilting and with the chart fully unfolded

See more data at champshealth.org



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