Innovative tools to solve global problems: Vitamin A deficiency

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The Problem: Vitamin A Deficiency

- 13 million people in 23 countries
- Affects primarily young women and children
- Results in Xerophthalmia – nutritional blindness
- Easily corrected with vitamin A as supplement, fortificant or dietary
Background

• ~ 40 million preschool children suffer from vitamin A deficiency (VAD)
• WHO estimates 13 million preschoolers have some degree of eye damage as a result of VAD
• ~ 250,000 to 500,000 suffer from total or partial blindness
Prevalence of vitamin A deficiency worldwide
... vitamin A deficiency causes blindness in children.
The problem is...
Why measure vitamin A in dried blood spots?
Benefits

• Less Invasive

• Greater Access to Remote Populations

• Minimal Cold Chain

• Decreased Health Hazard

• Small Sample Size
Development of the Method


- Demonstrated that vitamin A was stable in DBS
Village in Afghanistan
Can DBS be used to assess vitamin A deficiency?

YES . . .
if DBS are properly collected.
. . if DBS are properly handled. .
if DBS are properly collected.

Good Quality Blood Spot:
... but not if improperly collected
... but not if improperly collected
... but not if improperly collected
Summary

• Given the limitations of serum retinol to assess VAD, DBS is a useful predictor.

• DBS are more convenient than serum collection.

• It is absolutely essential that DBS be collected and stored properly.

• Correlations ($r^2$) between plasma retinol and DBS retinol in well-nourished subjects range from 0.88 to 0.90.

• Correlations ($r^2$) between plasma retinol and DBS retinol in deficient populations range from 0.73 to 0.84.
The sensitivity of DBS retinol identifying deficient subjects (< 0.7 \(\mu\)mol/L) ranged from 73 to 98%.

The specificity of DBS retinol identifying adequate subjects (\(\geq 0.7 \mu\text{mol/L}\)) ranged from 93 to 100%.

DBS retinol appears to be stable up to 5 months at room temperature.

The serum volume of DBS can be estimated using DBS weight or sodium content.
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