

# Uruguayan Women's Breast Cancer Knowledge: Using Novel Modeling Techniques

Deborah E. Linares M.A.<sup>1</sup>, Lydia P. Buki Ph.D.<sup>2</sup>,  
Micaela Reich, Ph.D.<sup>3</sup>, Selva Sanabria<sup>4</sup>, & Dolores Larrosa<sup>4</sup>

*<sup>1</sup>University of Illinois at Urbana-Champaign, <sup>2</sup>University of Miami,  
<sup>3</sup>Universidad Católica del Uruguay, <sup>4</sup>Comisión Honoraria de Lucha Contra el Cáncer*



# Breast Cancer in Uruguay

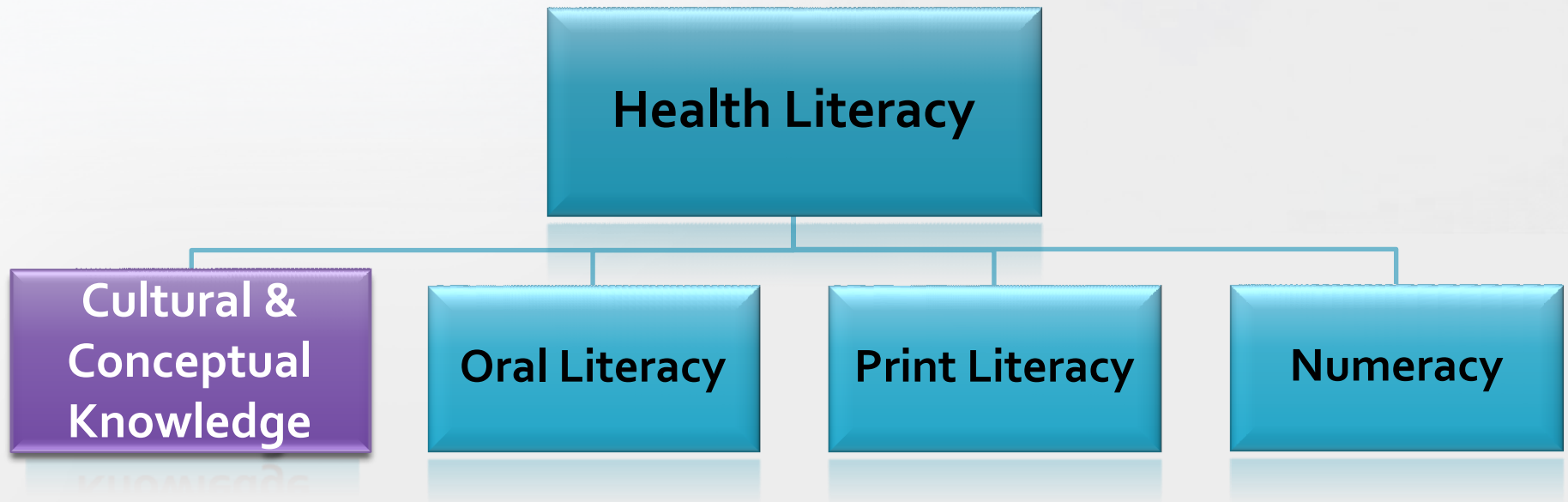
- Highest breast cancer mortality rate in Latin America and continues to increase over time (Ferlay et al., 2010; WHO, 2012)



# Breast Cancer Knowledge in Uruguay

- Overall, research in this area is sparse
- In the U.S., women who have more breast cancer knowledge are more likely to:
  - Be younger (Jimenez et al., 2011)
  - Have children (Bird et al., 2010)
  - Have higher levels of formal education (Ramirez et al., 2000)
  - Obtain mammography screenings (Harris et al., 2003)
- Communities shape women's breast cancer knowledge levels by hosting educational programs, providing access to information, and influencing the quality of resources available (Bigby, 2007)

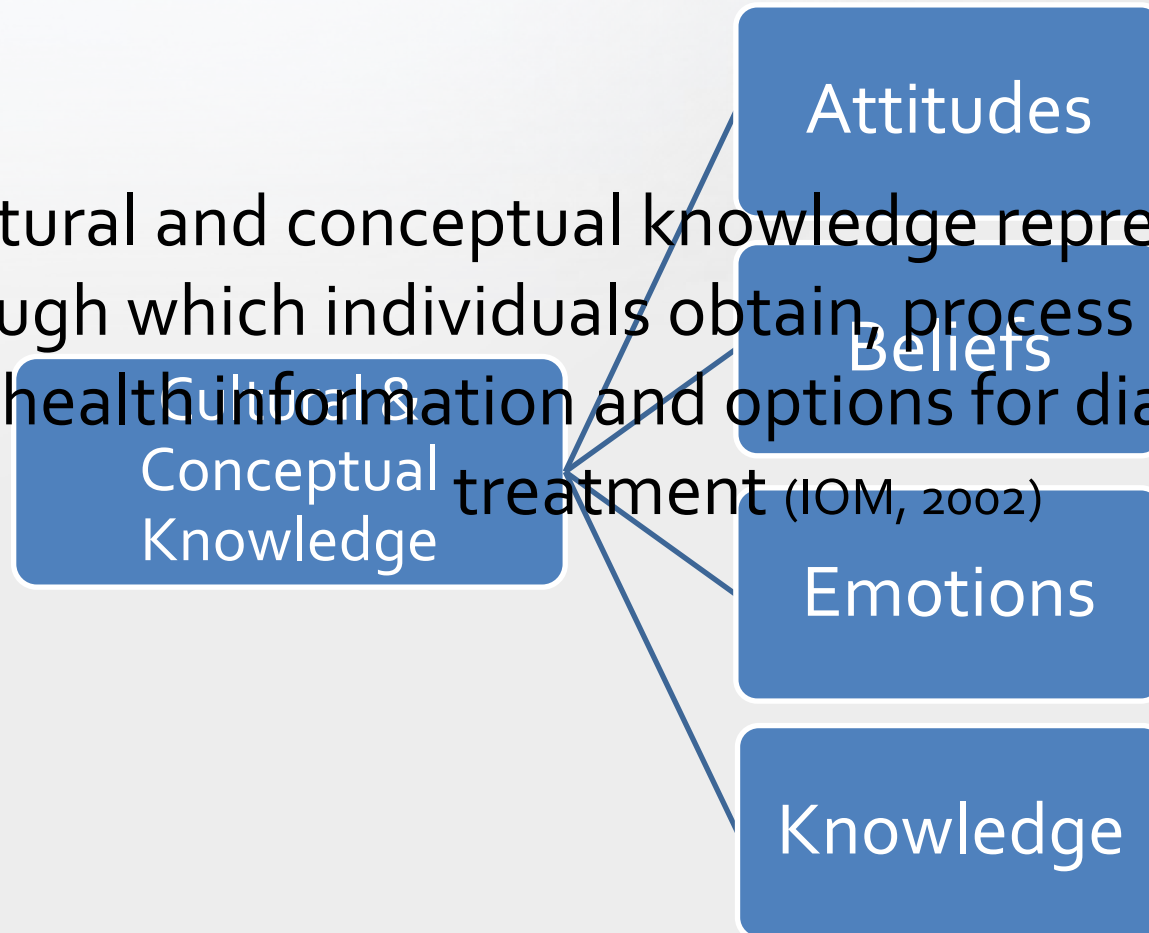
# Health Literacy



(IOM, 2002)

# Cultural and Conceptual Knowledge

Cultural and conceptual knowledge represents the filter through which individuals obtain, process and understand health information and options for diagnosis and treatment (IOM, 2002)



(Buki & Quintero  
Johnson, 2009)

# Aim of the Study

Examine the psychometric properties of the breast cancer knowledge subscale and explain the influence of individual level variables (mammography screening status, age, education level, area of residence) on participant characteristics and item responses.

# Sample

- Recruitment and data collection were done in collaboration with the *Comisión Honoraria de Lucha Contra el Cáncer*
- National sample of 410 women ages 40-65 years was obtained from 5 departments: Artigas, Flores, Maldonado, Montevideo, and Treinta y Tres
- Approximately half of participants were up to date for mammography screening ( 2 years)

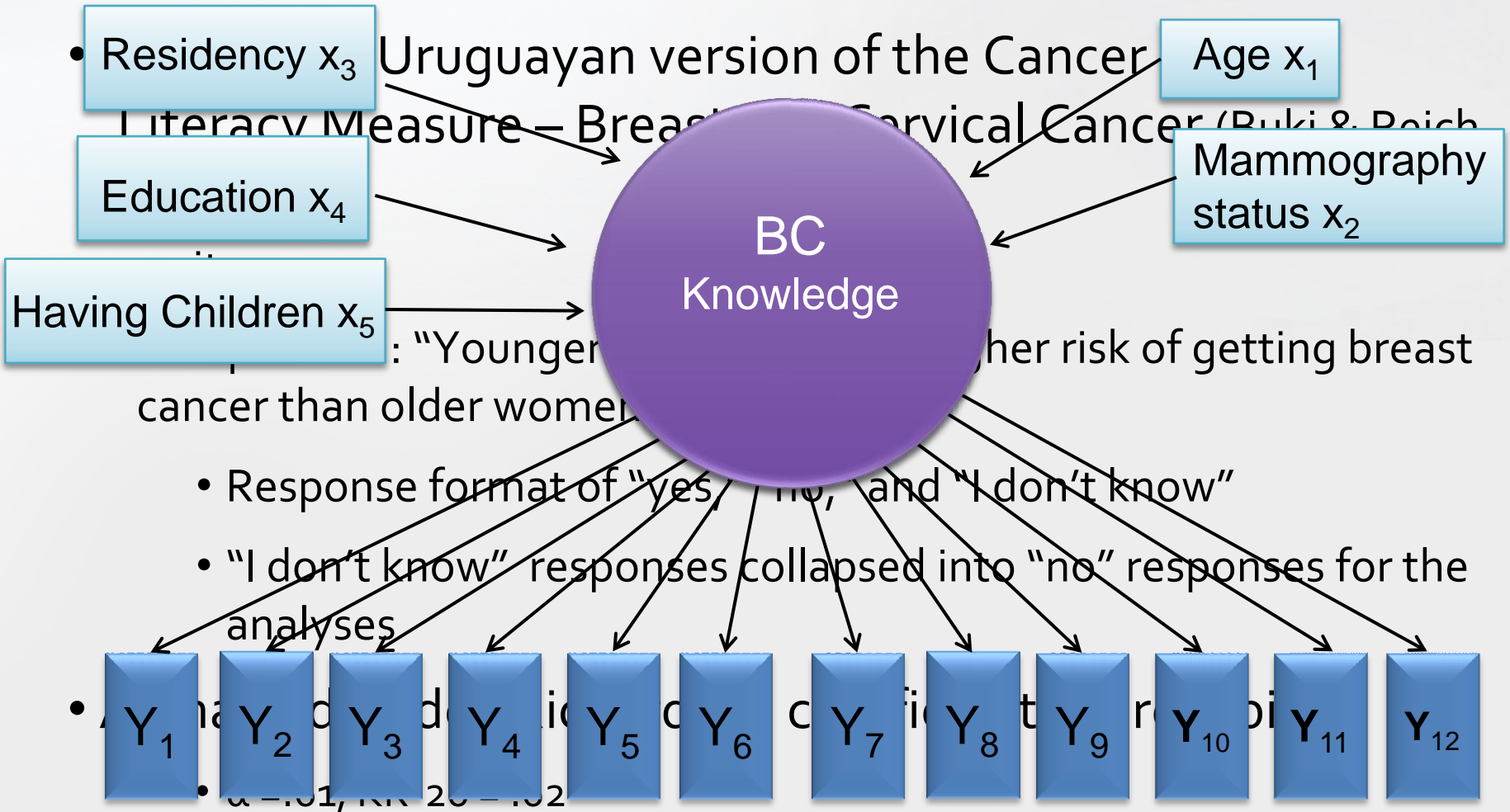
	Mean	%
Age	51 years	-
Education level	10.43 years	-
Have Children	-	92%

# Explanatory Item Response Modeling (EIRM)

- Within the Item Response Theory (IRT) family
- Innovative measurement approach using generalized linear and non-linear mixed models (De Boeck & Wilson, 2004)
- Models how properties of items and participant characteristics influence item responses
  - Provides information about participants to help determine differences in knowledge levels
- Appropriate method for handling measurement error and dependency within data
  - Protects against inflating standard error



# Breast Cancer Knowledge Subscale



# Results

- A 2PL EIRM was fit to the data using SAS 9.3 PROC

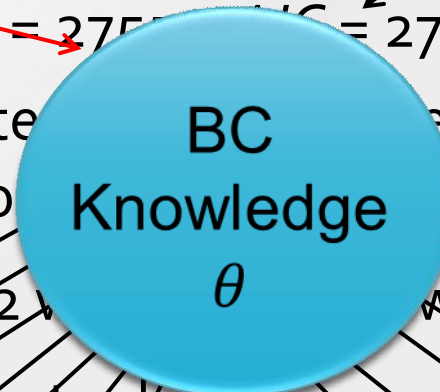
**Maldonado**  $x_1$  (SAS Institute, 2011)  
(OR = .794)

**Flores**  $x_3$   
(OR = 1.612)

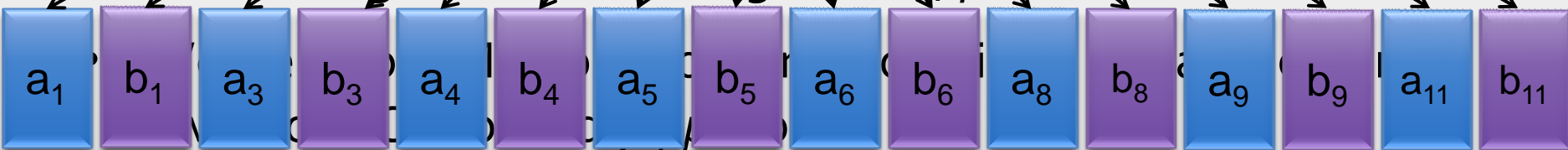
**Mammography status**  $x_4$   
(OR = 2.364)

**Having Children**  $x_2$   
(OR = 1.978)

**Artigas**  $x_5$   
(OR = 1.612)



- Items 2, 7, 10, and 12 which improved item fit
- Women who were up to date for a mammogram, had children, and were from Flores and Artigas were more likely to have **higher** BC knowledge levels,  $p < .0001$



→ = decrease in BC knowledge

# Conclusion

- Having children, mammography status, and women's residency, explained breast cancer knowledge item responses
- Demonstrate utility of EIRM for health literacy measurement development
- Provide information on screening barriers and facilitators within a universal healthcare system

## **Implications and Future Directions**

- Develop educational interventions to increase BC knowledge targeting women (40-65 years) who have not obtained a mammogram screening within 2 years, do not have children, and reside in Maldonado

# References

- Bigby, J. A. (2007). The role of communities in eliminating healthcare disparities: Getting down to the grassroots. In R. A. Williams (Ed.), *Eliminating healthcare disparities in America: Beyond the IOM report*. Totowa, NJ: Humana Press Inc.
- Bird, Y., Moraros, J., Banegas, M.P., King, S., Prapasiri, S., & Thompson, B. (2010). Breast cancer knowledge and early detection among Hispanic women with a family history of breast cancer along the U.S.-Mexico border. *Journal of Health Care for the Poor and Underserved*, 21(2), 475-488.
- Buki, L. P., & Reich, M. (2012). Adaptation and validation of the CLM-BCC for Uruguayan women. Unpublished manuscript.
- Buki, L. P., & Quintero Johnson, J. M. (2009, October). *Cultural and conceptual knowledge: Conceptual and measurement advances in health literacy*. Poster presented at the meeting of the Health Literacy Annual Research Conference, Washington, D.C.
- De Boeck, P., & Wilson, M. (2004). *Explanatory item response models: A generalized linear and nonlinear approach*. In P. De Boeck & M. Wilson (Ed.). New York City: Springer.
- Ferlay, J., Shin, H. R., Bray, F., Forman, D., Mathers, C., & Parkin, D. M. (2010). *Cancer incidence and mortality worldwide: IARC CancerBase no 10*. [GLOBOCAN 2008]. International Agency for Research on Cancer. Retrieved from <http://globocan.iarc.fr>
- Harris, D., Miller, J., Davis, D. (2003). Racial differences in breast cancer screening, knowledge and compliance. *Journal of the National Medical Association*, 94(8), 693-701..
- Institute of Medicine. (2002). *Health literacy: A prescription to end confusion*. Washington, D.C.: The National Academies Press.
- Jimenez, E. A., Xie, Y., Goldsteen, K., & Chalas, E. (2011). Promoting knowledge of cancer prevention and screening in an underserved Hispanic women population: A culturally sensitive education program. *Health Promotion Practice*, 12(5), 698-695.
- Ramirez, A., Suarez, L., Laufman, L., Barroso, C., & Chalela, P. (2000). Hispanic women's breast and cervical cancer knowledge, attitudes, and screening behaviors. *American Journal of Health Promotion*, 14(5), 292-300.
- Ratzan, S. C., & Parker, R. M. (2000). Introduction. In C. R. Selden, M. Zorn, S. C. Ratzan, & R. M. Parker (Eds.), *National library of medicine current bibliographies in medicine: Health literacy*. Bethesda, MD: National Institutes of Health, US Department of Health and Human Services: NLM Pub. No. CBM 2000-1.
- SAS Institute. (2011). In Baxter A. (Ed.), *Base SAS® 9.3 procedures guide*. Cary, NC: SAS Institute Inc.
- World Health Organization (2012). Mortality database. Retrieved from <http://www.who.int/whosis/mort/download/en/index.html>

# Final Model Parameter Estimates

Parameters	Est.	Std Error	<i>df</i>	<i>t</i> value	<i>p</i> value
b1/a1	-1.62	0.09	4007	-18.05	<.0001
b3/a3	4.07	0.68	4007	5.95	<.0001
b4/a4	-2.80	0.19	4007	-14.61	<.0001
b5/a5	-2.75	0.19	4007	-14.77	<.0001
b6/a6	-1.58	0.05	4007	-29.50	<.0001
b8/a8	-2.30	0.12	4007	-18.81	<.0001
b9/a9	-1.92	0.12	4007	-15.92	<.0001
b11/a11	-2.48	0.32	4007	-7.81	<.0001