

PSID Biomeasure Outline: Infectious Disease

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1. Introduction

- a. Overview of infectious disease and related measures
 - i. Significance to public health, health disparities, policy
 - ii. Background on infectious disease, approaches to measurement: symptom reports, physician diagnoses, biomarkers
 - iii. Background on the immune system: innate and adaptive immunity, enumerative and functional measures, mucosal and systemic processes
 - iv. Background on inflammation, potential measures (CRP, IL-6, TNF α , IL-1)
- b. Applications in current/prior domestic, community-based surveys

2. Potential contributions to generation of scientific knowledge

- a. *Infectious origins of chronic disease?* Recent research into the contribution of inflammation and infectious exposures to the development and progression of chronic degenerative diseases has directed attention to the potential contribution of chronic, low-grade exposure to infection—and the body's response to pathogens causing disease—as contributors to morbidity and mortality in adulthood. Measures of infection and/or pathogen exposure in PSID may provide information on an important, but understudied, pathway linking environmental quality and health. This may be a particularly important mechanism contributing to health disparities.
- b. *Impact of early life exposures* A rapidly growing literature is documenting the importance of prenatal nutrition—typically indexed by birth weight—on a wide range of adult outcomes, including diseases related to immune function. In addition, exposures to infectious disease in infancy and childhood have been associated with adult outcomes. Recent research has suggested that infectious disease early in life may increase adult risk for CVD through upregulation of inflammatory pathways, whereas immunological research on the “hygiene hypothesis” suggests that the *absence* of infectious exposures early in life may bias immune development in ways that increase risk for allergy, asthma, and other morbidities related to inflammation. Data on the long term impact of pathogen exposure early in life would make innovative contributions to these issues.
- c. *Contribution of stress to altered immune function and increased disease risk* Psychosocial stress is an important determinant of mental and physical health, and the connections among stress, suppressed immune function, and increased

inflammation are well-established. Measures of inflammation and immune function provide opportunities to document the physiological impact of psychosocial stressors, and to identify pathways through which these stressors may impact morbidity and mortality.

- d. *Contribution of infectious morbidity to educational performance* Minor infectious diseases are the primary sources of morbidity for school-aged children, and a major reason for routine school absence. What is the contribution of frequency of infection, or level of immune function as a proxy for risk of infection, to school absence? To school performance and attainment?

3. Synergies with features of the PSID

- a. Longitudinal data provide opportunities for linking early exposures with later life outcomes. Data from the CDS may be particularly valuable in this regard.
- b. Wide age range allows consideration of differential causes and consequences of infectious disease.
- c. Data on family, housing, and neighborhood environments provide opportunities to evaluate the likelihood of pathogen exposures concurrently, as well as early in life.
- d. Large, national sample moves way beyond current research on immune function, which is limited primarily to experimental or small opportunistic samples. Inflammation is receiving more attention in population-based surveys, but the size and longitudinal design of PSID will provide unique opportunities for innovative analyses.

4. Measurement options, feasibility, and costs

- a. Symptom reports; diagnosis reports; reports of health in childhood (e.g., HRS 1996 topical module); concurrent and retrospective measures
- b. Biomarkers of infection: e.g., OMT for HIV; blood samples for CMV, HSV; urine for STIs)
- c. Proxy indicators of pathogen exposure: housing density (# people/room); older siblings; domestic animals; day care attendance; interviewer observation
- d. Anthropometric measures of the quality of early environments (related to infectious disease, as well as nutritional status): birth weight; height-for-age in childhood; adult height; adult height relative to same-sex parent; sitting height/leg length
- e. Measures of immune function
 - i. Mucosal, enumerative, and functional measures; options for sample collection
- f. Measures of inflammation
 - i. CRP, IL-6, TNFa, IL-1; options for sample collection

- g. Feasibility and costs of different modes of sample collection and analysis; subsampling strategies?

5. Legal/ethical issues

- a. Notifying individuals of results of tests
- b. Special considerations if HIV and/or STI testing is implemented

6. Conclusions

- a. Overall recommendations on strategies for implementation of measures of infectious disease, immune function, and inflammation; advantages/disadvantages of adding these measures.