
VHAS: The Vietnam Health & Aging Study



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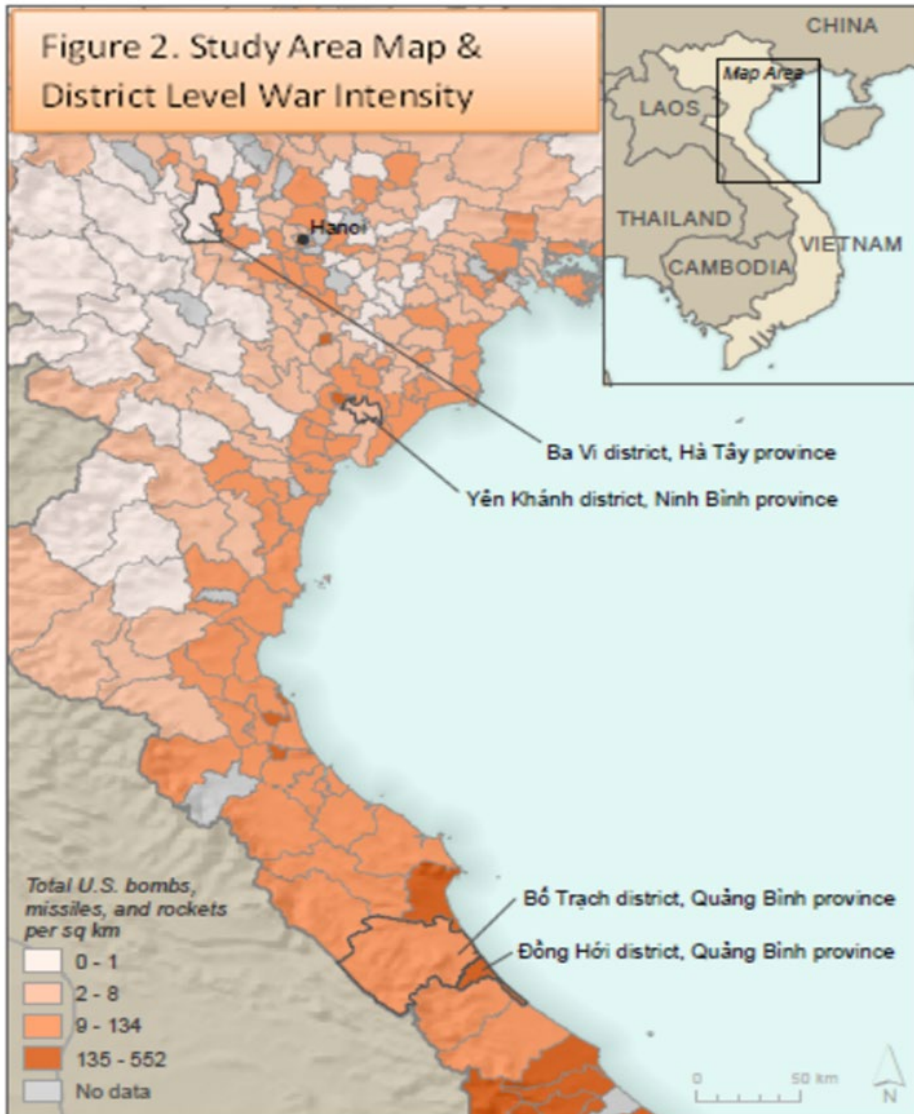
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VHAS Overview

Figure 2. Study Area Map & District Level War Intensity



- Examine linkages between **early life war exposure, mortality, morbidity & aging processes.**
- In-person interview & biomarker data (**N=2,448 adults age 60+**)
 - Vietnam War cohort – teens/ young adults during 1965-75
 - Multi-stage probability sampling; purposive selection of 4 districts; random selection in sex/service strata
 - Wave I (Summer 2018) & Wave II (Summer 2021)
- **Omnibus survey;** emphasis on health/functioning, military service, war-related stressors
- **Main biological components:** anthropometrics, BP, grip strength, PEF, capillary blood collection, hair collection

Summary:

Existing VHAS Wave I Biomarker Data

Measure	N
Age	2448
Blood pressure (x 2)	2319
BMI	2266
Body-fat percentage	2018
Mid-arm circumference (cm)	2278
Calf circumference (cm)	2241
Waist circumference (cm)	2272
Hip circumference (cm)	2272
Peak expiratory flow rate (x 3)	2250
Grip strength (x 2)	2239
HbA1c	1964
Complete Blood Count (CBC)	2207- 2190



Capillary Blood & Hair Sample Collection

- Finger-stick collection into POC capillary tubes & microtainers (required volume ≈ 0.4 mL)
- Point of Care (POC) analysis:
 - HbA1c: Diazyme Smart Assay System
 - CBC: QBC Star Hematology Analyzer
- Processing, frozen storage of buffy coat fraction (N=2210) & plasma fraction (N=2208)
- Hair collection (N=2215)



Table 1: Biomarker testing summary (see Appendix C Lab Details for more information)

Biomarker	Sample type	Facility	Method
DNA Methylation age ("epigenetic clock"; Horvath et al 2016)	PBMCs from buffy coat fraction of EDTA-anticoagulated blood	Kobor Lab	Illumina HumanMethylation450 Bead Chip ^{97,98}
Telomere Length	PBMCs from buffy coat fraction of EDTA-anticoagulated blood	UW Pathology	qPCR ⁹⁶
Cytokines, metabolic hormones, inflammatory proteins (IL-6, IL-1ra, IL-18, IL-10, TNF α , IFN γ , TNFR1, Ghrelin, Leptin, Adiponectin, Resistin, Ferritin & CRP)	Plasma from EDTA-anticoagulated blood	Hanoi	Quansys multiplex (Custom 13-plex) ¹¹¹⁻¹¹³
Growth factors (IGF, IGFBP)	Plasma from EDTA-anticoagulated blood	Hanoi	Conventional ELISA (IGF1, R&D Systems DG100; IGFBP3, R&D Systems DGB300)
Lipid profile (total cholesterol, HDL cholesterol, ApoB)	Plasma from EDTA-anticoagulated blood	Hanoi	Clinical lab analyzer and conventional ELISA (R&D Systems DAPB00) ¹¹⁴
Glycosylated hemoglobin (HbA1c)	Whole blood (EDTA anti-coagulated)	Tested in the field by POC	POC (Diazyme Smart Assay System)
Complete blood count (CBC)	Whole blood (EDTA anti-coagulated)	Tested in the field by POC	POC (QBC Star Dry Hematology analyzer)
Cortisol	Hair	UW CSDE	Conventional ELISA ⁹⁹ (Meyer et al 2014)
Circulating proteins (BUN, creatinine, globulins, total bilirubin, albumin, alkaline phosphatase, ALT, AST, GGT, lactate dehydrogenase, total proteins, uric acid)	Plasma from EDTA-anticoagulated blood	Sherbrooke, QC	Commercial analysis (Biron, Inc.)
Ions/electrolytes (Fe, Na, Cl, Ca, K, Mg, P)	Plasma from EDTA-anticoagulated blood	Sherbrooke, QC	Commercial analysis (Biron, Inc.)

Preliminary Results – HbA1c

- Tested on site using Diazyme Smart assay system; results generally seem higher than expected
 - NGSP traceable, FDA approved, CLIA waived, and ran two instruments side by side throughout
 - Diazyme quality controls were consistently within range.
 - Troubleshooting in the field including temperature/humidity control, retraining, frequent testing of QC materials, on-board instrument verification, and side by side testing with Diazyme and A1cNow for a small subset (n=35 paired results)
 - Diazyme – A1cNow average difference 0.7%
 - Small scale test of the Diazyme instruments back in the lab at UW showed consistently higher results from Diazyme as compared to A1cNow in QC materials from a different supplier
 - A1cNow results are in expected range based on 12 other clinical analyzers, Diazyme results are higher than expected

Lessons from the Field

1. POC processing times, high temperatures, and humidity were challenges
2. A1c test results
3. Capillary blood draw for POCTs & stored samples created challenges, but yielded sufficient sample volume for multiple assays & DNA methylation
4. Local challenges in equipping data collection & lab set-up
5. Surprising ease of implementing hair collection



Thank you!