

# Bringing Inexpensive Genomics to New Mexico to Reduce Health Disparities and Fuel Economic Growth

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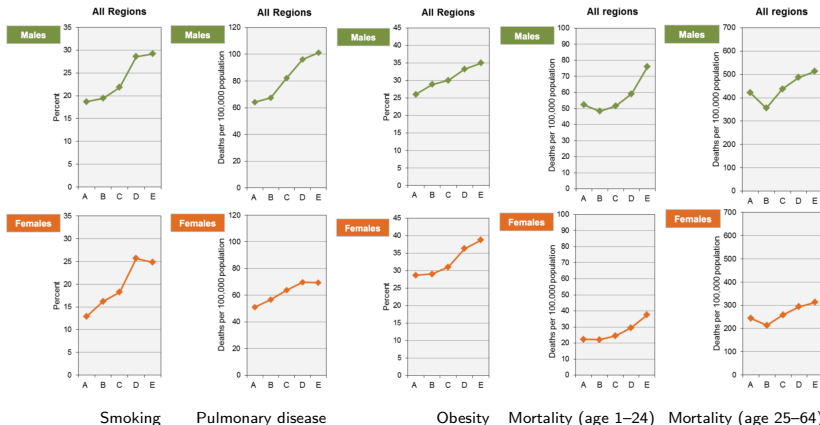
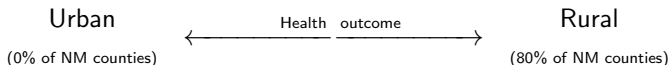
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5 August 2016

## A guiding message:

- ▶ New Mexico already has **many health disparities**
- ▶ Current trends in precision medicine depend on massive economies of scale that **create barriers** to access
- ▶ **Lack of access** to genomics-based diagnostics will **amplify** existing health disparities
- ▶ New Mexico must pro-actively help **counter these trends**

**Solution: develop genomics capability that will be accessible throughout New Mexico to advance health care and drive economic growth**

# Health outcomes worsen in rural regions



— Meit et al. (2014)

# The Future: The Precision Medicine Initiative



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## NEWS RELEASES

Wednesday, July 6, 2016

### NIH awards \$55 million to build million-person precision medicine study

*Launch expected later this year*



The National Institutes of Health today announced \$55 million in awards in fiscal year 2016 to build the foundational partnerships and infrastructure needed to launch the Cohort Program of President Obama's [Precision Medicine Initiative \(PMI\)](#). The [PMI Cohort Program](#) is a landmark longitudinal research effort that aims to engage 1 million or more U.S. participants to improve our ability to prevent and treat disease based on individual differences in lifestyle, environment and genetics. The awards will support a Data and Research Support Center, Participant Technologies Center and a network of Healthcare Provider Organizations (HPO). An [award](#) to Mayo Clinic, Rochester, Minnesota, to build the biobank, another essential component, was announced earlier this year. All awards are for five years, pending progress reviews and availability of funds. With these awards, NIH is on course to begin initial enrollment into the PMI Cohort Program in 2016, with the aim of meeting its enrollment goal by 2020.

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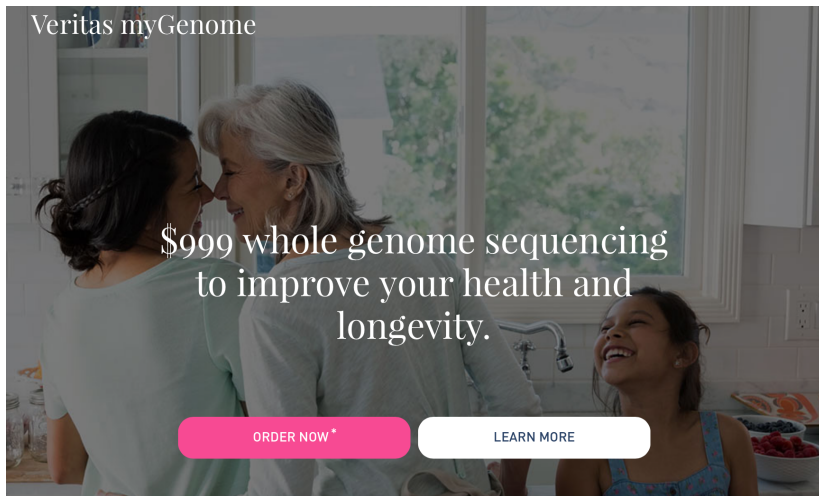
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## The \$1,000 genome: Veritas Genomics

A woman with dark hair and a young girl with dark hair are smiling and looking at each other in a kitchen. The woman is on the left, and the girl is on the right. They are both wearing light-colored shirts. In the background, there is a large window with a view of greenery outside. The overall atmosphere is warm and positive.

Veritas myGenome

\$999 whole genome sequencing  
to improve your health and  
longevity.

[ORDER NOW\\*](#)

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- ▶ Genome-based diagnostics are the promise for improved health care

# The \$1,000 genome requires a \$10,000,000 investment

## Whole-genome sequencing power

Maximum throughput for population- and production-scale genomics



- ▶ Additional associated equipment and expertise required
- ▶ 2–3 month delay: cannot provide real-time analysis of outbreaks or cancer progression, for example
- ▶ **The \$1,000 genome is possible only with massive economies of scale**

# The Future: Precision Medicine with elite partners

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Wednesday, July 6, 2016

### NIH awards \$55 million to build million-person precision medicine study

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- ▶ Mayo Clinic, Rochester, Minnesota
- ▶ Vanderbilt University Medical Center, Nashville, Tennessee
- ▶ Broad Institute, Cambridge, Massachusetts
- ▶ Verily (formerly Google) Life Sciences, Mountain View, California
- ▶ Scripps Research Institute, San Diego California
- ▶ Vibrent Health, Fairfax, Virginia
- ▶ Columbia University Medical Center, New York City
- ▶ Northwestern University, Chicago
- ▶ University of Arizona, Tucson
- ▶ University of Pittsburgh

# Amplifying health disparities

- ▶ High volume genome sequencing and economies of scale are driving the conversation around genome-based diagnostics and precision medicine
- ▶ Precision medicine based upon high-volume genome sequencing will be available only in elite medical facilities
- ▶ Small, rural, and tribal clinics will *at best* have access indirectly
- ▶ **Current trends in genomics will amplify health disparities**



# Keeping it simple:

## The obvious solution to reducing disparities

Develop genomic diagnostic technology that:

- ▶ Is low cost to operate,
- ▶ Requires little clinical investment,
- ▶ Demands little technical expertise, and
- ▶ Can be deployed outside elite molecular genetics laboratories.

**Leverage comparative advantages to allow New Mexico to benefit from precision medicine and advance economically**

# Comparative advantages of this project

- ▶ Existing **handheld** DNA sequencing devices are leveraged
- ▶ Genome coverage is **tunable** to allow a broad spectrum of diagnostics
- ▶ Procedure is **easy** to perform
- ▶ **Real-time** analysis: data are available within minutes
- ▶ **Low operating cost** and **minimal investment**: targeting \$10 assays requiring less than \$10,000 investment



# Project goal: validate the fundamental approach

- ▶ Verify comparability between high-throughput instruments, e.g., HiSeq, and handheld units, e.g., MinION
- ▶ Verify consistency among runs and samples
- ▶ Verify tunability

*The outcome of this project will be **validated** handheld DNA sequencing **technology** that is suitable for **deployment** in any medical facility **worldwide** and that is a **foundation** for a broad spectrum of **diagnostics**. Widespread access will help **counter** the **disparities** in access to health care currently being amplified by the trends in precision medicine.*

## Significance and impact

*The proposed handheld technology has broad scope for economic development in addition to improving health care.*

*New Mexico must advance approaches to precision medicine that will **reduce, not amplify, disparities** in health care and health outcomes.*