Artificial Intelligence for SDoH

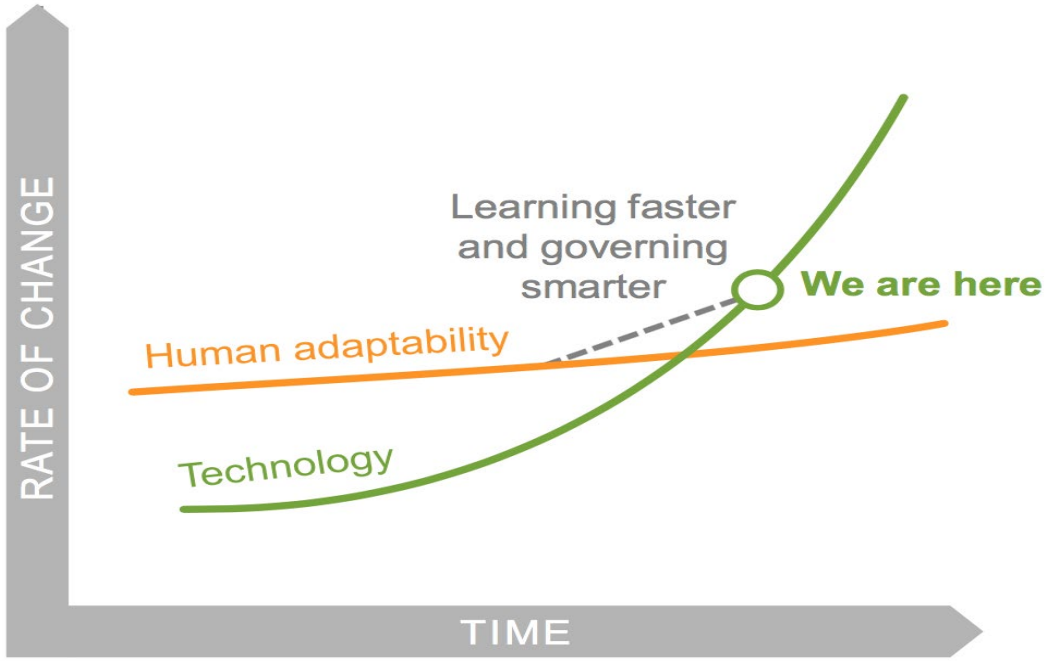
Steve Miff, PhD

November 15, 2019

AGENDA

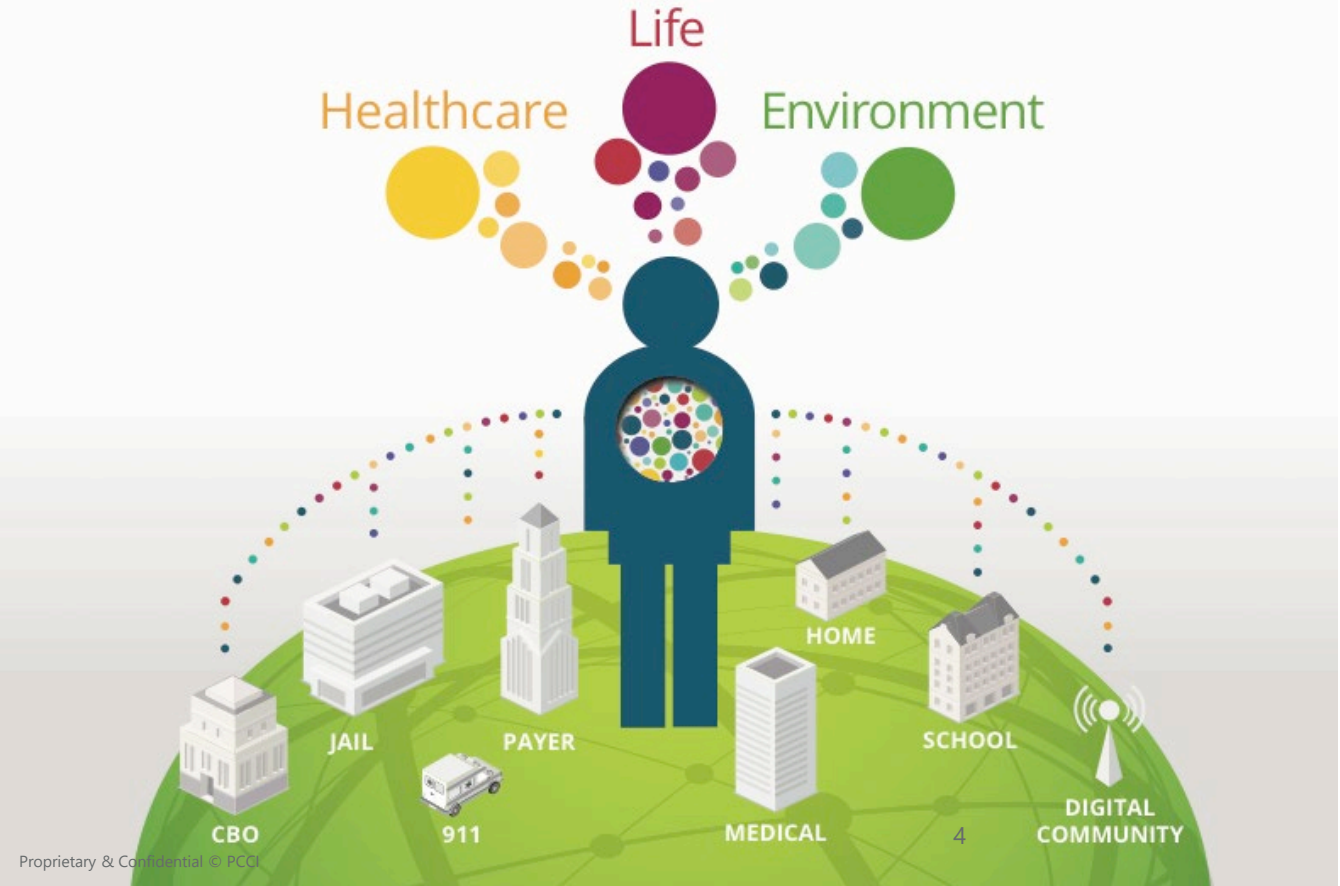
- Key Innovations Driving Healthcare Digital Innovation
- SDoH Applications and Case Studies

HEALTHCARE INNOVATION IS GROWING FASTER THAN EVER



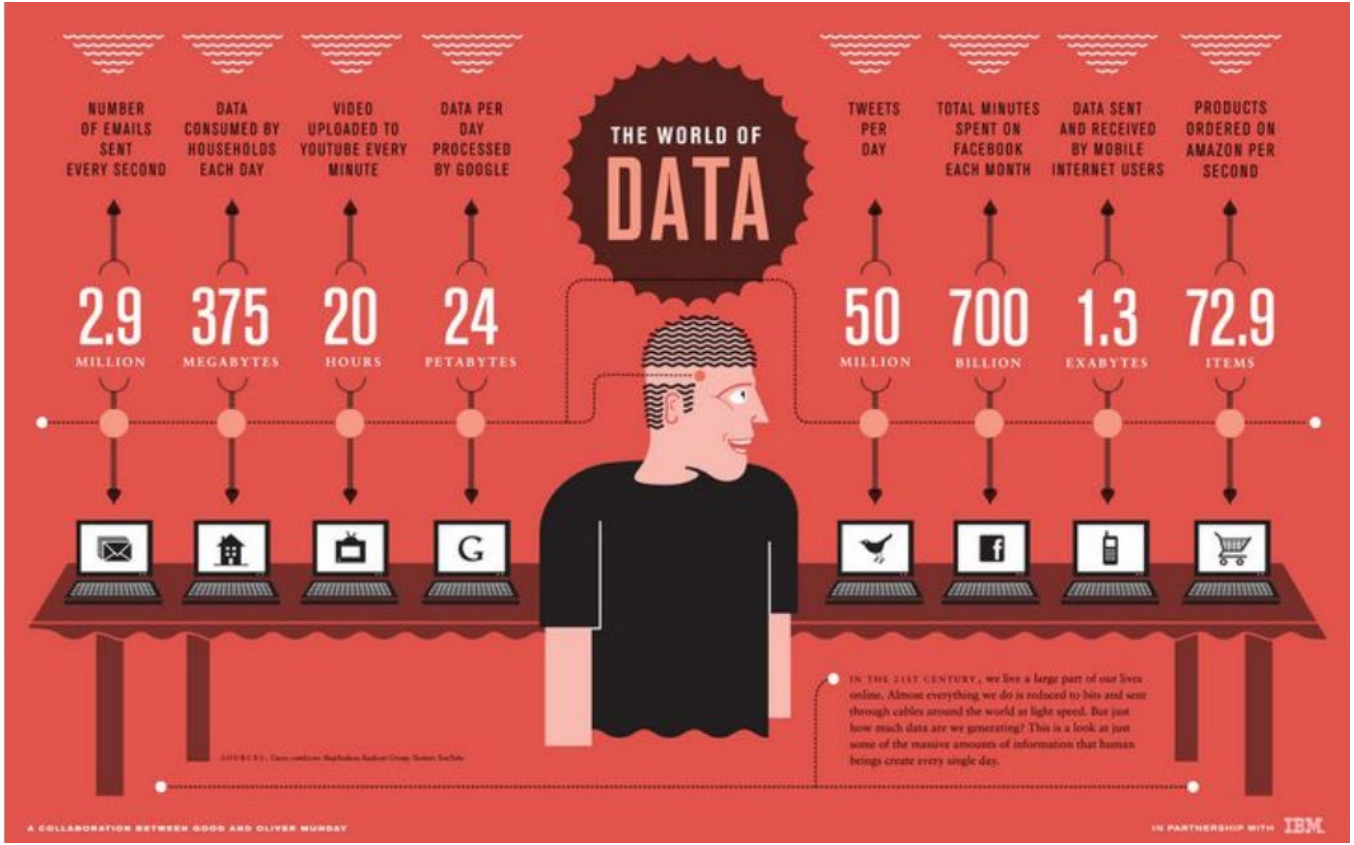
Source: Adapted from Sg2 and Friedman T. *Thank You for Being Late, An Optimist's Guide to Surviving in an Age of Acceleration*. Farrar, Straus & Giroux: 2016.

SOCIAL DETERMINANTS OF HEALTH



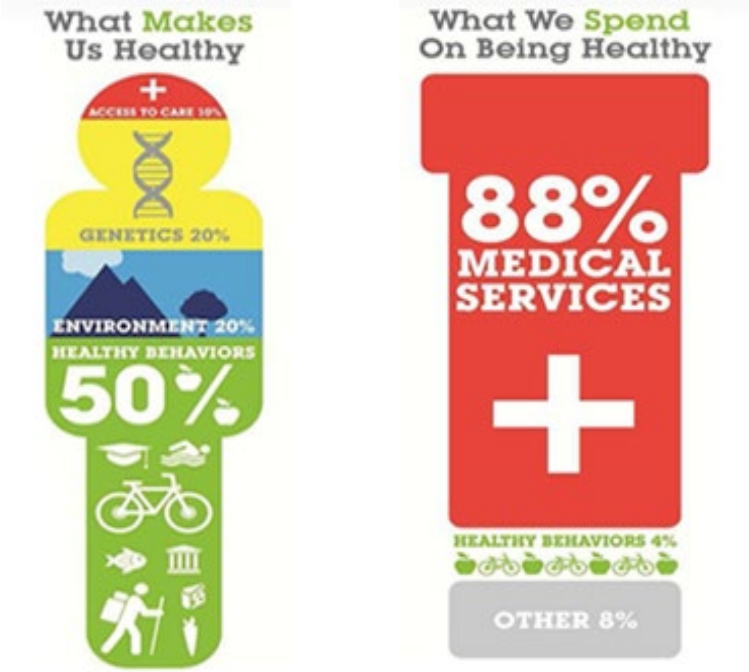
…health begins where we live, learn, work, play and pray.

THE RAPIDLY EXPANDING WORLD OF "LIFE" DATA



EXPANDING WORLD OF SOCIAL DETERMINANTS OF HEALTH DATA

Health vs. Health*care*

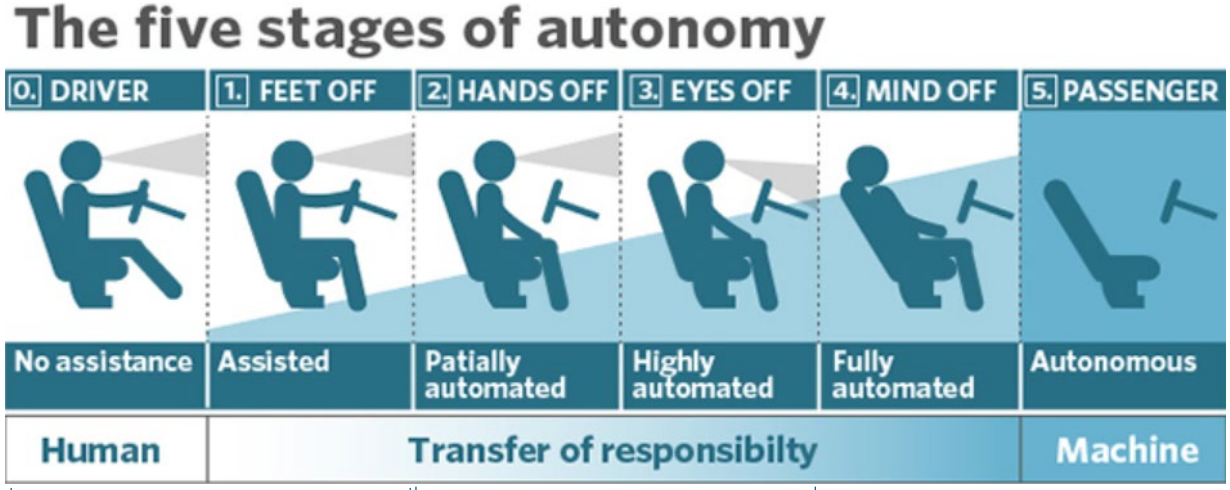


SDoH data comes in many forms, but it's critical to population health.

SDoH REQUIRES ADVANCED ANALYTICS CAPABILTIES

APPLYING THE DRIVERLESS CAR FRAMEWORK TO HEALTHCARE AI

(referred and adapted from Eric Topol, MD)



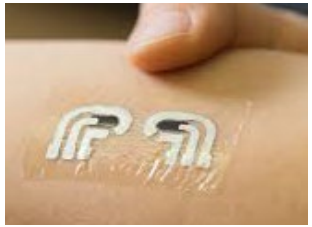
We are here in healthcare

For clinical care we won't get beyond this. Back-office/admin workflows may get more automated

Sources: Evercore ISI, SAE International

AI AND PRESCRIPTIVE ANALYTICS REQUIRE NEW ECOSYSTEMS

Physical Sciences



End User Insights

Next-Gen Measures

Data Science strengths need to be complemented with other capabilities

Data Science Excellence

27 Co communication | 21 Sci science

Communication Science

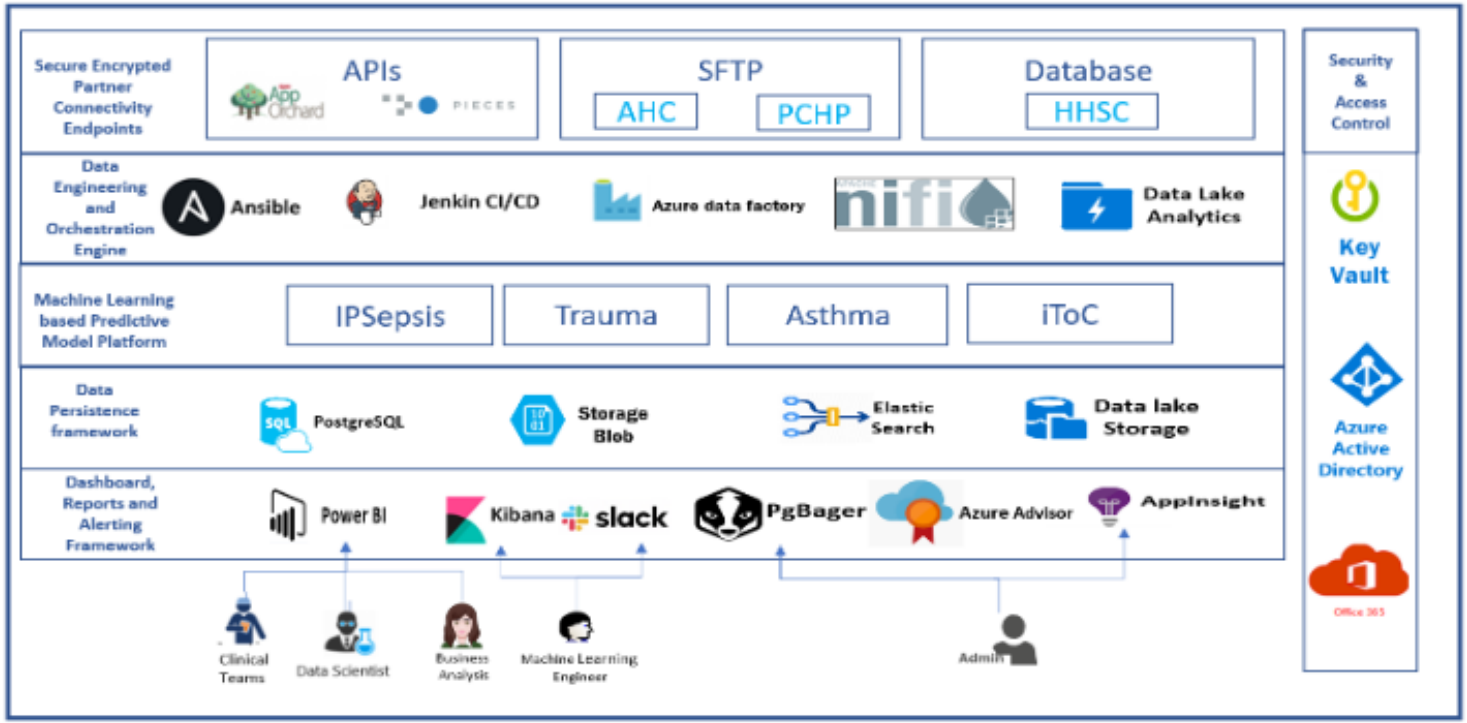
Next-Gen Data Visualization

Data Emersion [AR/VR]

Disruptive/ Enabling Platforms

PCCI

TECHNOLOGY INFRASTRUCTURE EXAMPLE: PCCI ISTHMUS



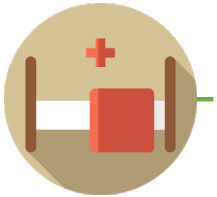
CASE STUDIES

- Preventing Adverse Drug Events (PARADE)

PARADE: IP WORKFLOW

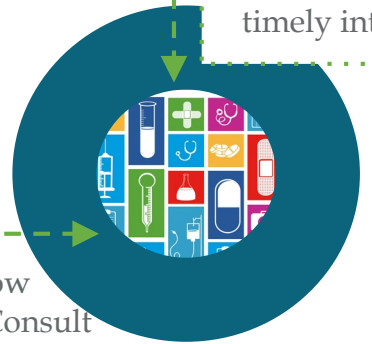
PROVIDER initiated consult

87,000 Patients



PARADE predictive score identifies High Risk patients

Admission medication reconciliation and timely interventions



PARADE enhanced workflow
High Risk Proactive Pharmacy Consult

8,731 Patients

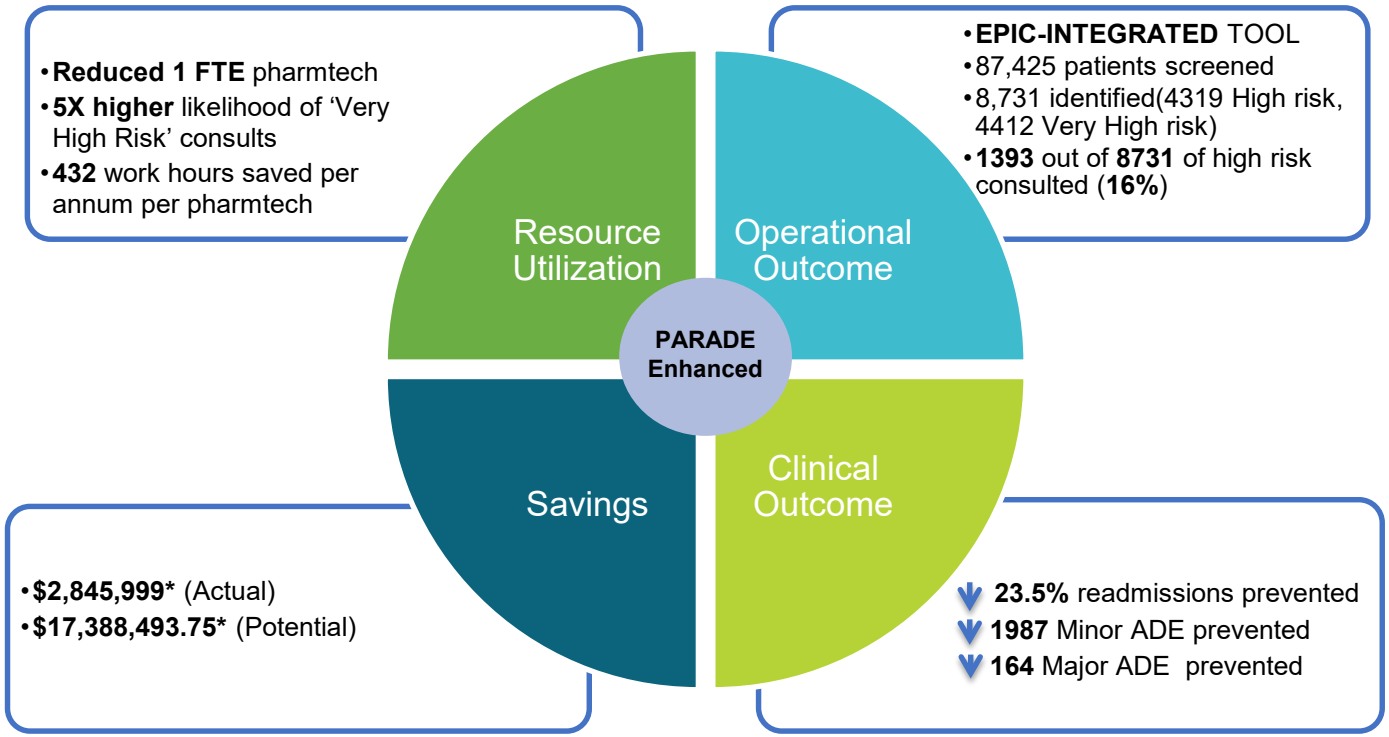
MEDICAL RECORD INTERFACE

Service Teams	Patient Same Name/Age/	MRN	Unit	Room/Bed	Bed Request Status	Isolation	Language	Pharmacy Consults	Pharmacy Consult (Acknowlec	Rx Med Hx Risk Score	Rx Med Hx Risk Rev	Rx Adm Med Hx
Hospitalist A	[redacted]		SEVEN PLASTIC SURG	07-637/01	—	—	Spanish	—	—	1.19	Never reviewed	✗
Hospitalist A			FIVE INSULIN ACU	05-636/01	—	—	Spanish	—	—	1.75	Never reviewed	✗
Hospitalist A			SIX BACU	06-613/01	—	—	English	TCU - CHF (ONLY for TCU Nurses) 11/01/2017		1.04	Never reviewed	✗

Medications:	0.69
Insulin:	0.8
Phenytoin:	
Fentanyl Patches:	
Metolazone:	
Methadone:	
Clozapine:	
PTA Meds Equals to 0 or Greater than 12 :	-0.1
Missing Dose or Sig:	-0.01
Anticoagulants on PTA:	
Coumarins on PTA:	
Antihyperglycemics on PTA:	
Disease States:	1.2
Diabetes Mellitus:	0.2
Chronic Lung Disease:	
Heart Failure:	0.65
Renal Failure:	0.35
Liver Disease:	
Substance Abuse:	
Other Criteria:	-0.14
Less than 25 or Greater than 50 Years:	0.35
Greater than 3 Hospitalizations:	
Greater than 3 ED Visits:	
Self Pay:	
Payor = Inmate:	
Admit from Clinic:	
Greater than 3 Outpatient Visits:	-0.5
Non-English Speaking:	0.01
Admit from Hospital:	
Admit from SNF:	

PARADE Impact

Go-live since June 12th 2017



*AHRQ estimates based on cost of ADE prevented and HCUP_AHRQ estimates, through reduction in 30-day readmission rate

PCCI

CASE STUDIES

- Connecting Clinicians with Community Based Organizations to Address SDOH

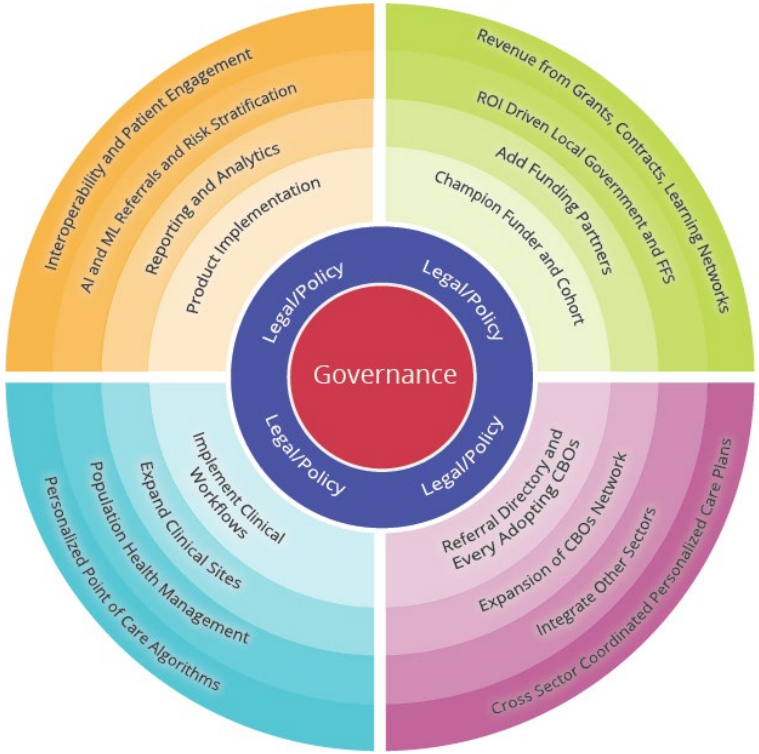
THE SDoH MODEL

Technology

Pieces Iris™ technology to create bi-directional exchange of information, smart referrals and individual tracking.

Clinical

Build clinical workflows and utilize predictive analytics and AI to prevent readmissions, save lives and reduce healthcare costs.



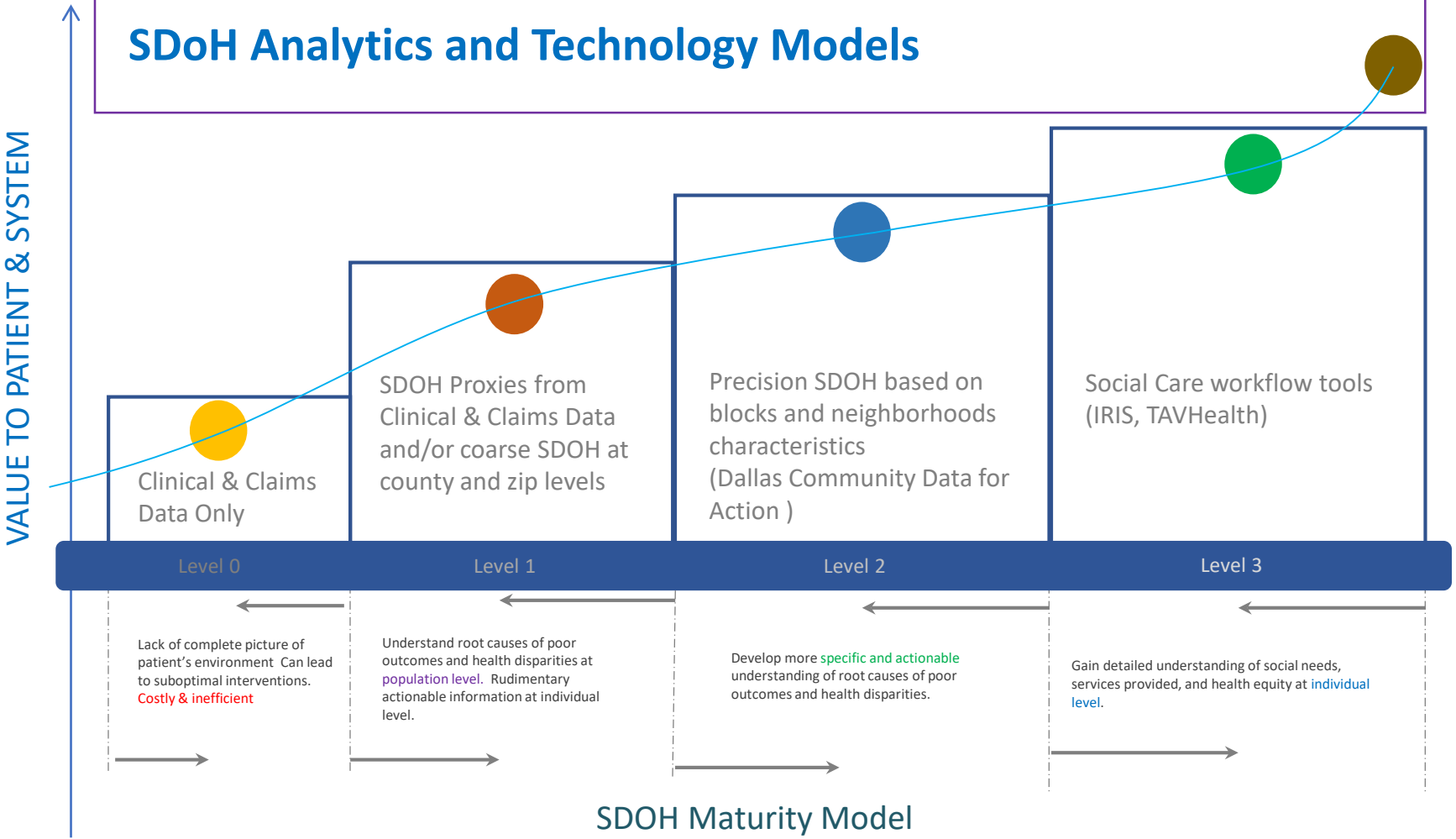
Sustainability

ROI and SROI to support ecosystem to provide better healthcare to the individuals in their communities. Strive to improve healthcare trends across the national continuum.

Community

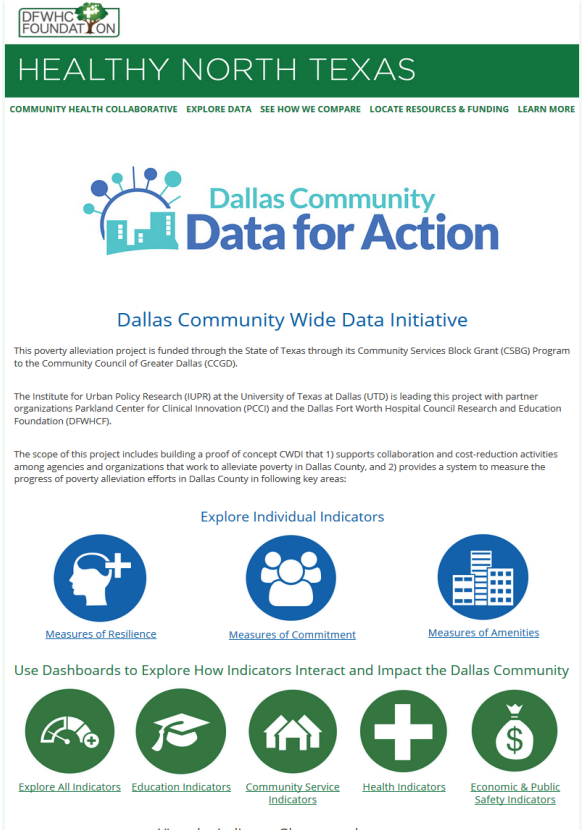
Develop **CBO** workflows and understand SDOH's impact on quality of life and how connected communities build a support system for a path to self sufficiency.

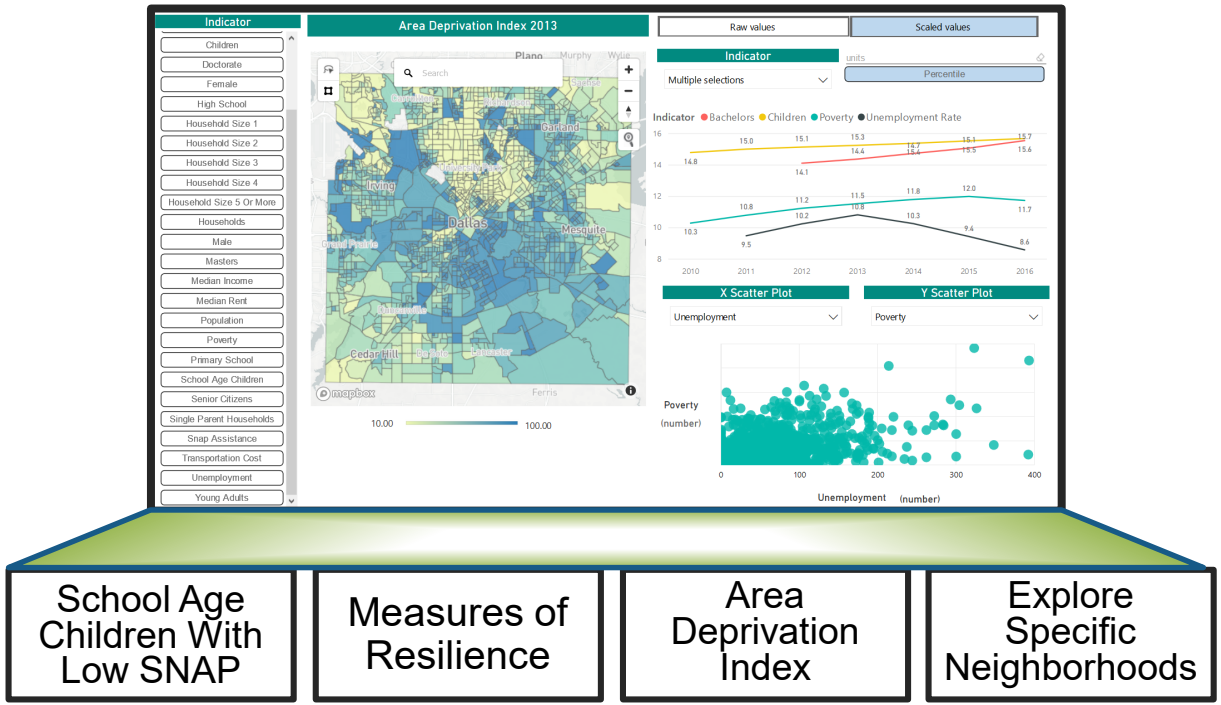
SDoH Analytics and Technology Models



DALLAS COMMUNITY DATA FOR ACTION

DALLAS COMMUNITY DATA FOR ACTION [DCDA] HELPS LEADERS VISUALIZE SOCIAL DETERMINANTS OF HEALTH





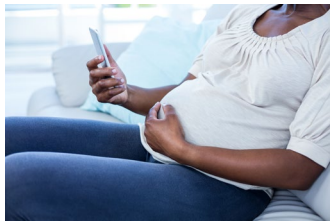
DCDA - Dallas Community Data for Action. DCDA was developed by PCCI in collaboration with Community Council of Greater Dallas, UTD Public Health and the DFWHC Foundation. It was in part funded by the CCGD through a block grant.

SDoH INTEGRATION TO IDENTIFY AT RISK POPULATIONS: MEDICAID PRETERM BIRTH PREVENTION PROGRAM

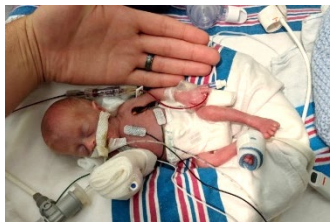
ML Based Risk Stratification, Care Re-Design and Personal Engagement

Increased prenatal care attendance

Increased timely, evidence-based interventions



Increased patient engagement



Preterm birth

By going upstream to provide outstanding prenatal care and patient engagement, PCCI can help providers decrease preterm birth rates, leading to:

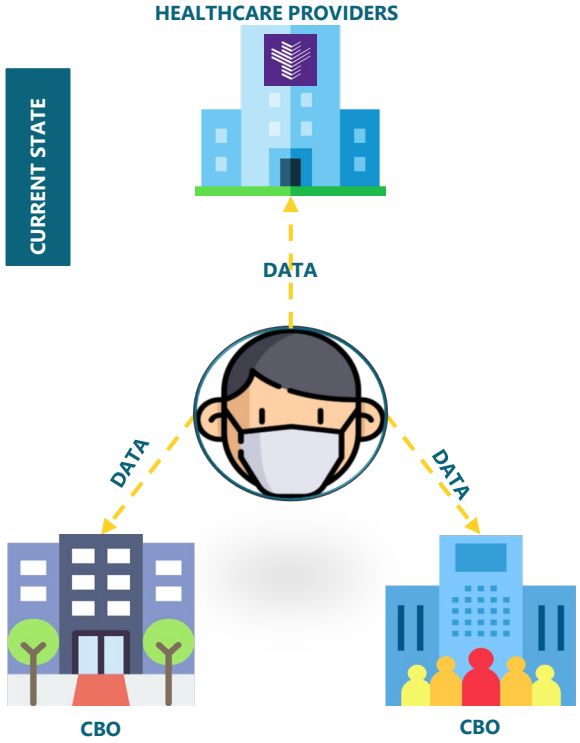
- Healthier mothers and babies
- Better health outcomes and shorter LOS
- Cost savings for patients, providers, and payers

Metric	Improvement
Prenatal Visit Attendance	**24% (p=0.013)***
Preterm Birth Rate	**27%**
Baby Cost PMPM	**54%**
Normalized Total Baby Cost	**$1.03 million**

CONNECTED COMMUNITIES OF CARE

CONNECTING COMMUNITIES

Partnering with the organizations that provide care to the community



Connected Communities of Care (CCC)

A program focused on addressing the health and social needs of a community by connecting healthcare providers and community organizations to coordinate the communication and care for individuals.

CCC Readiness Assessment

A robust needs assessment that **creates the roadmap** for CCC program implementation by identifying:

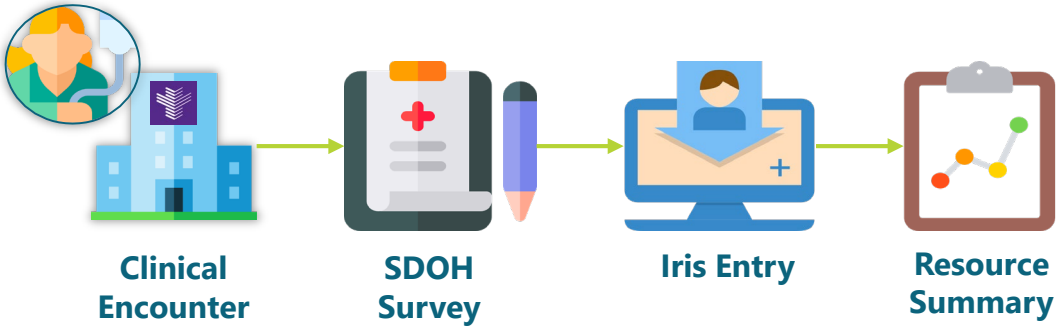
- Areas of need
- Readiness of Community Resources
- Current gaps in services and workflows

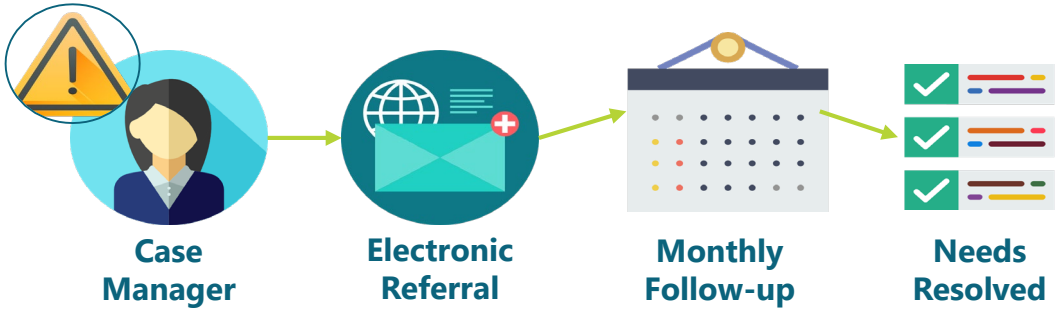
CCC Playbook

Resource that outline and **address every track required for the implementation** of the program including:

- Legal/Policy & Governance
- Clinical/Community Workflows
- Sustainability
- Technology

CONNECTING PEOPLE WITH CLINICAL AND SDoH NEEDS





Program Objective

The Accountable Health Communities Model tests whether systematically identifying and addressing the health-related social needs of Medicare and Medicaid beneficiaries' through screening, referral, and community navigation services will impact health care costs and reduce health care utilization.

Core Needs Addressed

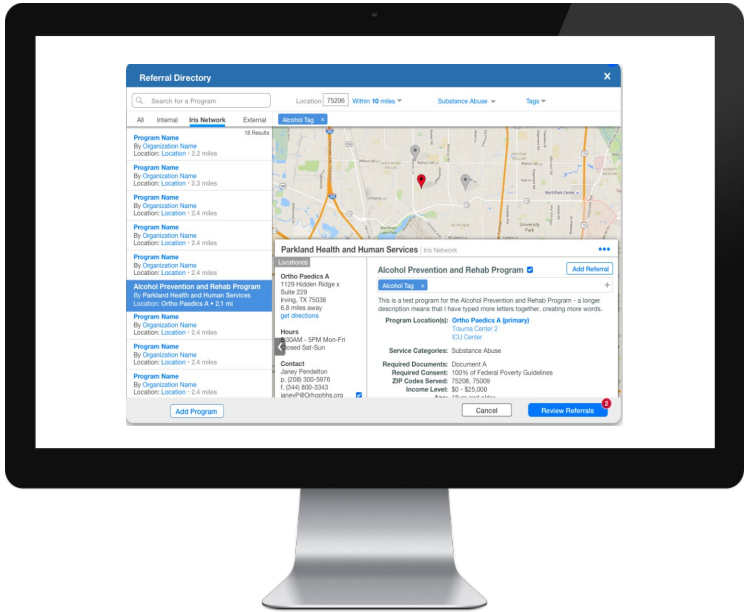
Housing • Utilities

Food • Transportation

Safety

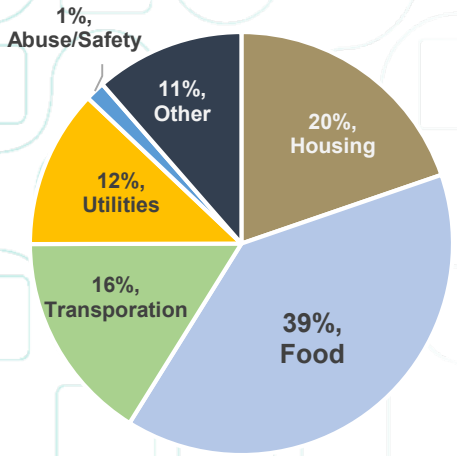
CONNECTING SDoH NEEDS TO COMMUNITY RESOURCES

- Cloud-based: accessible anywhere you get the internet
- Updated geo-mapped, referral directory
- Simple, configurable intake forms
- Security:
  - HIPAA compliant
  - 2-factor security
- Multiple levels of consent
- Multiple user roles to handle sensitive information
- Custom quick reports
- Training, legal documents, workflows



WHEN DATA SPEAKS- COMMUNITY

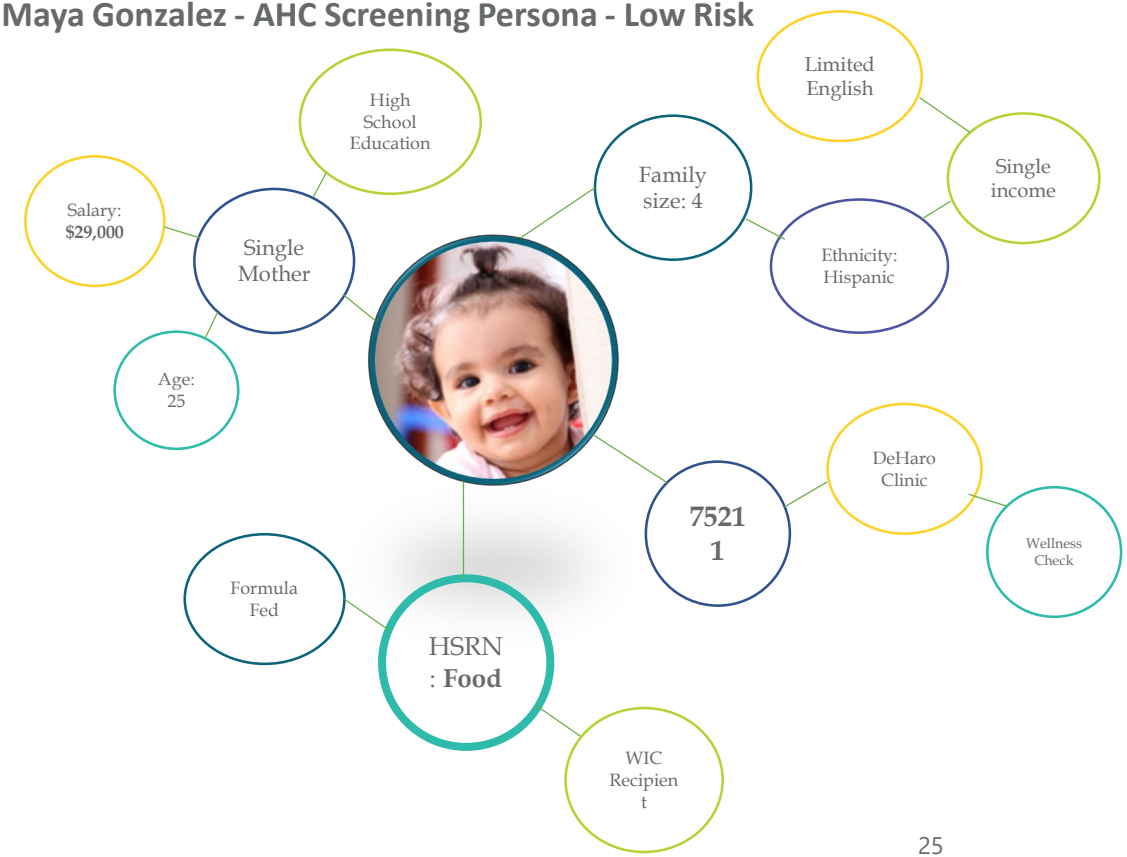
Food, Housing and Transportation Continue to be the Greatest Reported Needs



Across the AHC Zip Codes, we are seeing on average 2.4 needs per person

WHEN DATA SPEAKS- PERSON

Maya Gonzalez - AHC Screening Persona - Low Risk



AHC Cohort	
In Zip Code 75211	11%
Age < 10	75%
Age = 1	38%
Female	50%
Any Needs	40%
Food Need	70%
AHC Cohort, Age < 10 - Zip Code 75211	
Race/Ethnicity - Hispanic	89%
Preferred Language - Spanish	56%
Visit Reason - Immunization	42%
Visit Reason - Well Child Check	35%
Nutrition – Exclusively formula-fed	48%
Family is on WIC	75%
PHHS Pregnant Women - Zip Code 75211	
Marital Status - Single	49%
Median age	25
2017 ACS - Zip Code 75211	
Average Family Size	4.1
Family Type – Female Head of Household	43%
Education – High School Diploma Only	62%
Occupation Type (Female Only) – Sales & Office Occupations	36%
Median Family Income (1 female in labor force)	$25,554
Hispanic Origin - Mexican	79%
Owner-occupied houses	50%
Limited English-Speaking Households	43%

CASE STUDY: CHRONIC CONDITIONS AND FOOD INSECURITY

Data Across Sectors for Health

Objective

The objective for the project is to decrease adverse health events among food insecure and under-resourced populations with hypertension or diabetes in the Dallas metropolitan area by improving multisector care coordination through data sharing and collaboration between the Parkland Health & Hospital System (PHHS) and hunger relief agencies that regularly serve this population.

Results

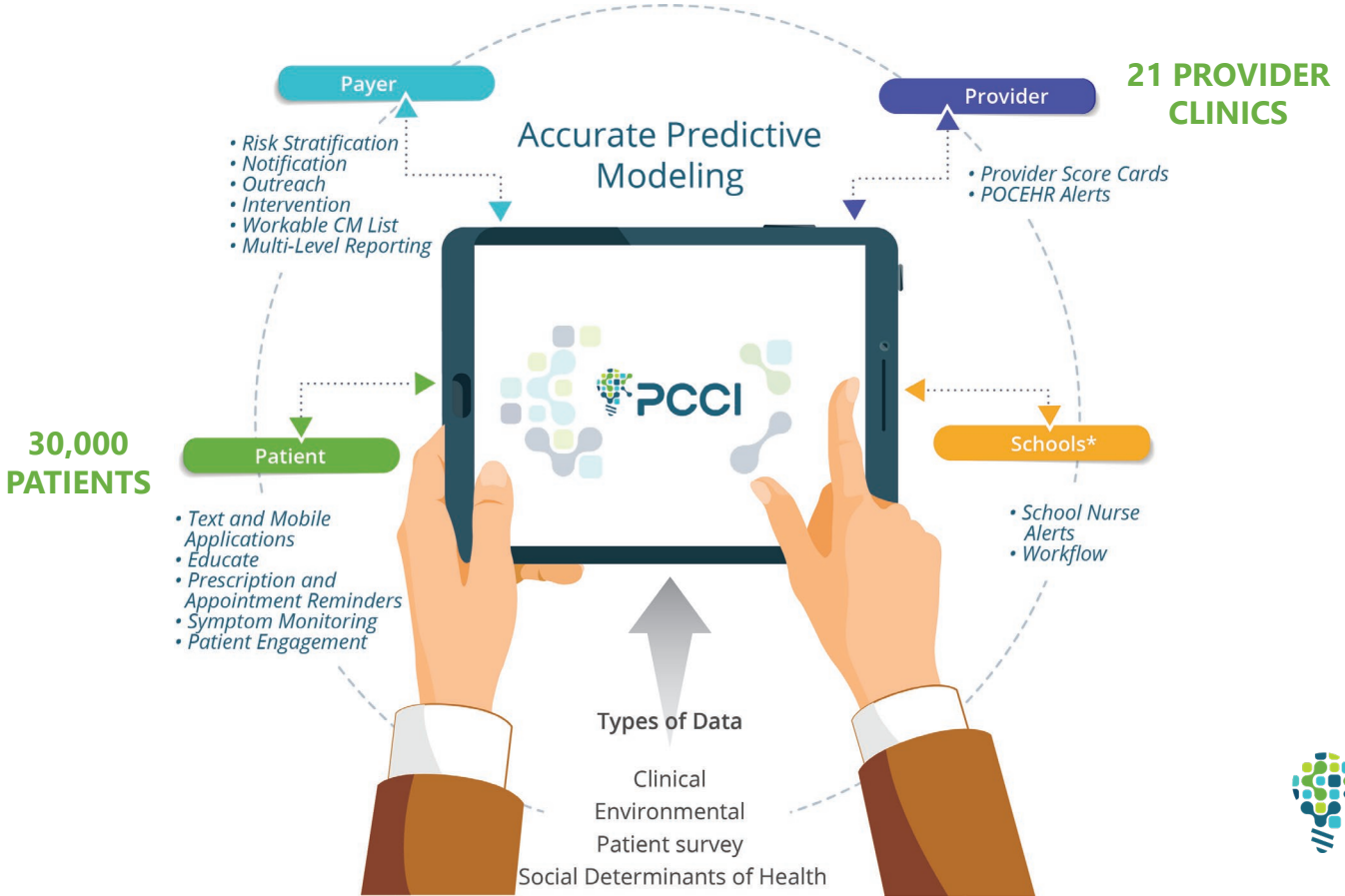
- 8% drop in ED visits vs 46% increase in non-intervention group
- 90% agree or strongly agree the program – and the support from the CBOs – has made them more able to manage their disease, fill their prescriptions and keep clinic appointments

PCCI

CASE STUDIES

- Developing a Multi-Channel SDoH Model

MULTI-CHANNEL PROGRAM FRAMEWORK

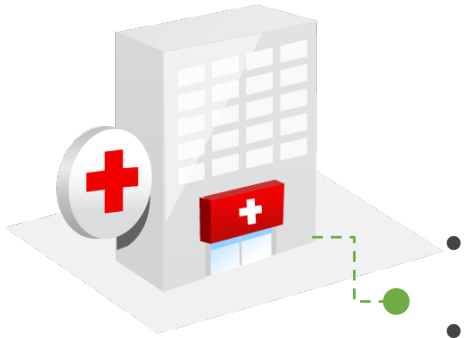


RESULTS… $24M in Savings

Clinical Improvement

- **32% - 50%** improvement in asthma controller medication prescription
- **15%** improvement in the asthma medication ratio (*HEDIS metric*)
- **Patient engagement** - **70%** high satisfaction and engagement score

Utilization Improvement



- **31%** drop in annual rates of asthma ED visits
- **42%** drop in annual rates of asthma inpatient admissions

Financial Improvement

40% drop in total annual costs
$24M savings

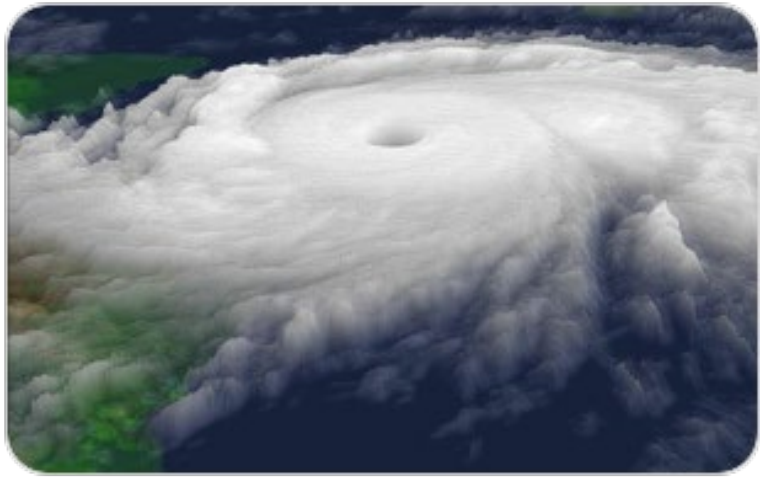
BUILDING CONNECTED COMMUNITIES - SDoH 2025

- **SDoH** will evolve into **PDoH** – ***P****ersonal* ***D****eterminants* ***o****f* ***H****ealth*

- PDoH will:
  - Be broadly integrated into ***C****ognitive* ***H****ealth* ***R****ecords* and built into AI-based risk predictive models
  - Evolve to integrate pharmacogenetic/genetic based data and measures of self-care capacity
  - Enhance access via digital connected communities

- Bridging isolation (mental and physical) will be a key focus

CHOLUTECA BRIDGE, HONDURAS



1998 Hurricane Mitch

- Rained 75 inches in less than four days
- Destroyed 150 bridges in Honduras
- Did not destroy the Choluteca Bridge

… AFTER HURRICANE MITCH

"The graceful arches of the Choluteca Bridge stand abandoned, a white concrete sculpture far from shore, linking nothing to nowhere.

The Choluteca Bridge itself is perfect… except that it now straddles dry land."

"We Can Do It If…." Vs. *"We Can't Do It Because…"*

THANK YOU