Health Informatics and Health Equity: Confronting Longstanding Disparities

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Health Disparities:

inequity in disease prevalence, incidence, morbidity and mortality rates.

Health Disparity Populations

Lower Socioeconomic (SES) Status People	Pacific Islanders/Native Hawaiians	Rural and Urban Residents
African Americans	Native Americans/Alaska Natives	LGBTQ+ People
Hispanics/Latinos	Women or Men *(varies by indicator)*	People with Disabilities

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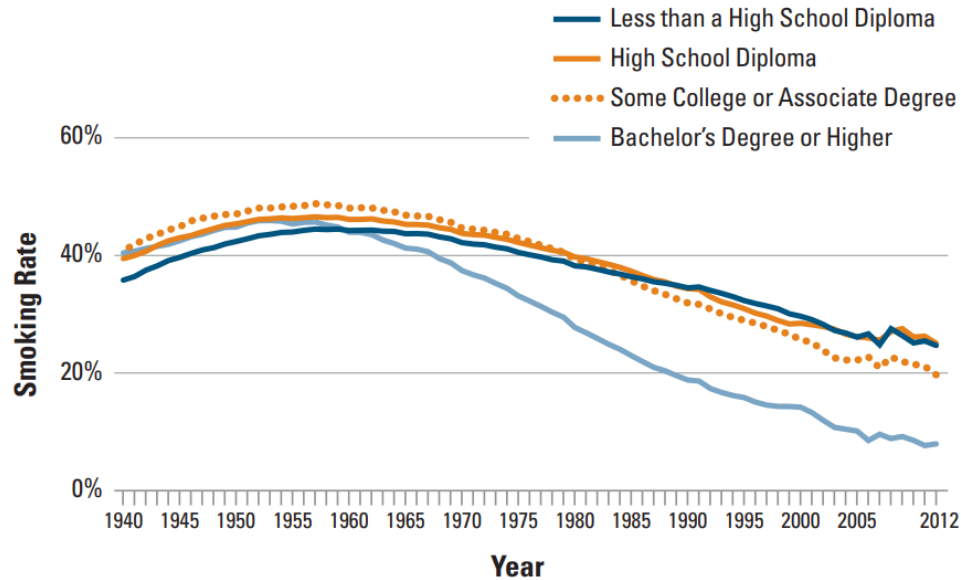
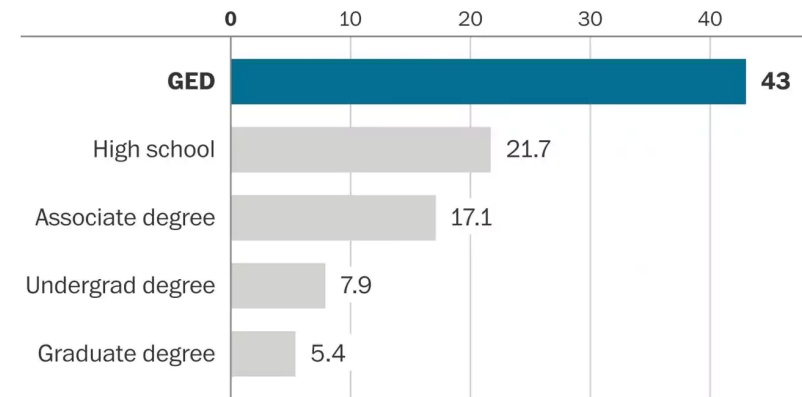# Intervention-Generated Inequality (IGI):

when interventions disproportionately benefit advantaged groups.

Example

Smoking Rates Among Individuals Ages 25 and Older, by Education Level, 1940–2012

- Less than a High School Diploma
- High School Diploma
- Some College or Associate Degree
- Bachelor's Degree or Higher

Smoking percentage by education level in 2015

Education Level	Percentage
GED	43
High school	21.7
Associate degree	17.1
Undergrad degree	7.9
Graduate degree	5.4

Source: CDC

THE WASHINGTON POST

IGI and Intervention Stages

Baseline Health Inequality

Inequality in Access

Inequality in Uptake

Inequality in Adherence

Inequality in Effectiveness

- Efficaciousness of intervention strategies for different groups
- Emphasis on individual behavior change
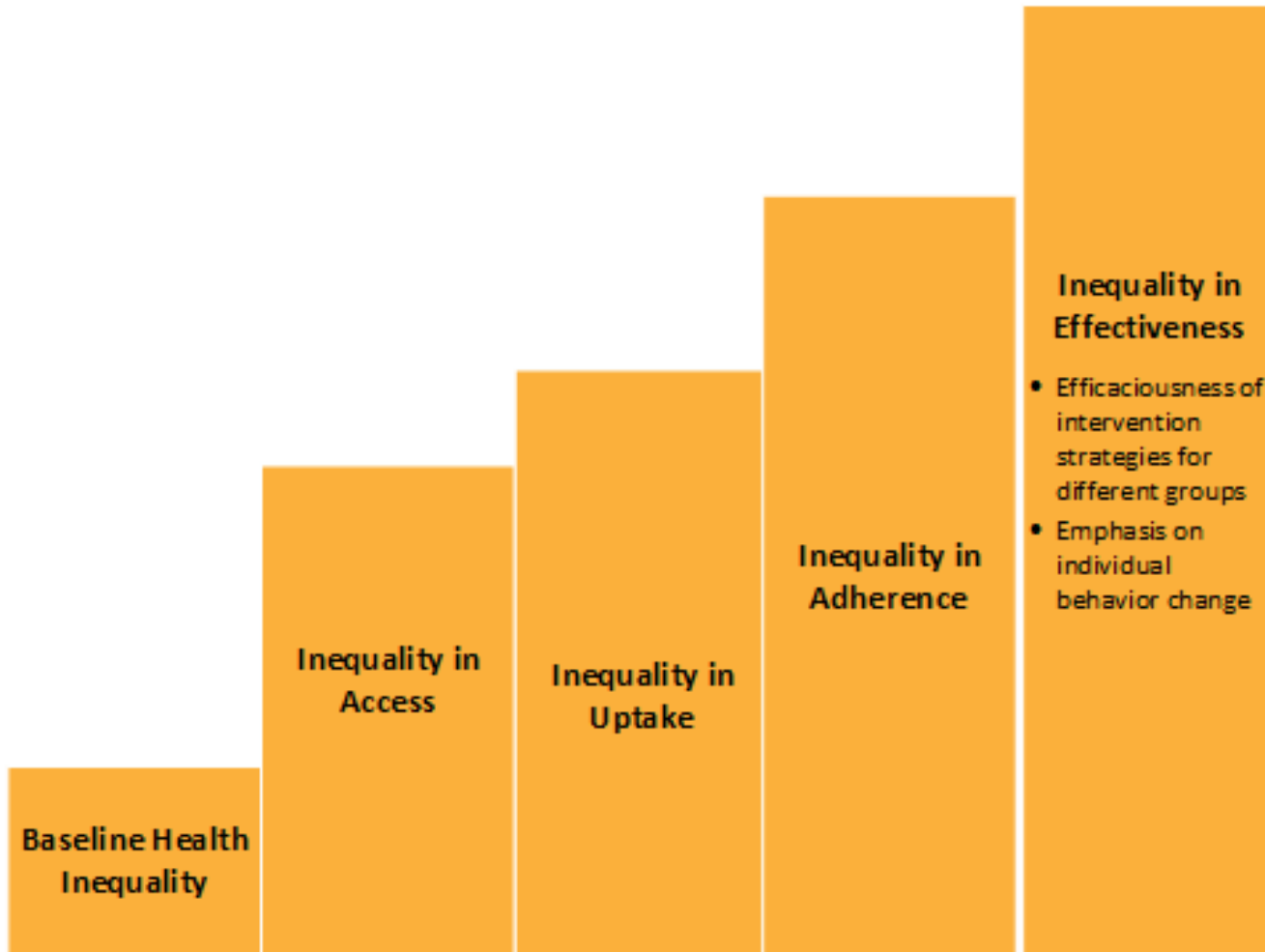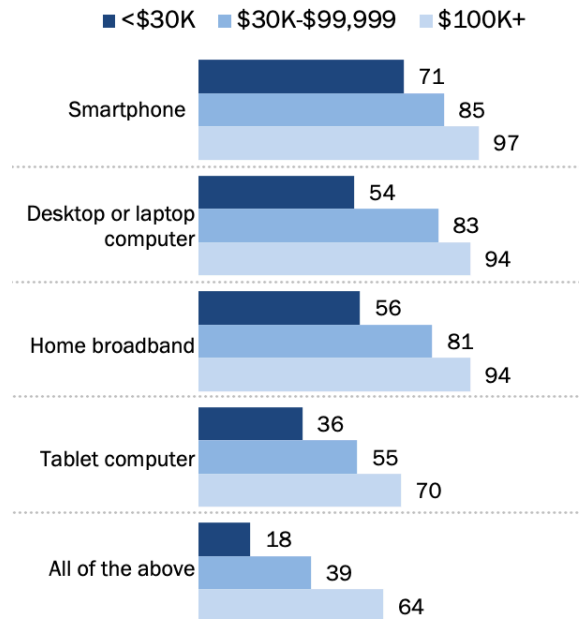
Access Differentials

Lower-income Americans have lower levels of technology adoption

% of U.S. adults who say they have the following ...

■ <$30K   ■ $30K-$99,999   ■ $100K+

Smartphone
- 71
- 85
- 97

Desktop or laptop computer
- 54
- 83
- 94

Home broadband
- 56
- 81
- 94

Tablet computer
- 36
- 55
- 70

All of the above
- 18
- 39
- 64

Note: Respondents who did not give an answer are not shown.
Source: Survey conducted Jan. 8-Feb. 7, 2019.

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Uptake Differentials: Patient Portals

Characteristics of survey respondents who did and did not use an online patient portal during the prior 12 months, 2017

Characteristic	All (N = 2,325)	Used a portal	
		Yes (n = 868)	No (n = 1,457)
Offered access by health care provider or insurer**			
Yes	60.3%	94.9%	41.2%
No	39.7	5.1	58.8
Sex**			
Female	53.9	58.5	51.3
Male	46.1	41.5	48.7
Race/ethnicity			
Non-Hispanic white	68.9	71.3	67.6
Non-Hispanic black	13.3	10.7	14.7
Hispanic	9.8	9.1	10.2
Non-Hispanic other	8.0	8.8	7.5
Age (years)**			
18–30	15.9	15.7	16.1
31–40	15.7	16.9	14.9
41–50	20.2	23.8	18.3
51–64	28.6	28.1	28.9
65 or older	19.6	15.6	21.7
Education***			
College or more	39.0	51.2	32.3
Some college	33.8	31.3	35.2
High school or less	27.2	17.5	32.5
Employment status***			
Employed	60.5	68.1	56.2
Not employed	39.5	31.9	43.8
Location**			
Urban	84.9	88.6	82.8
Rural	15.1	11.4	17.2
Insurance type***			
Private	61.4	71.8	55.6
Medicaid*	18.2	11.1	22.2
Medicare	18.7	15.8	20.4
Other	1.7	1.4	1.8
Has a regular health care provider***			
Yes	75.9	85.2	70.8
No	24.1	14.8	29.2

(Anthony, Campos-Castillo & Lim, 2018)

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Lower Education = Lower Adherence

Mental Health
- Internet-Based Relaxation RCT (Alfonsson et al. 2016)
- Web-based Psychotherapy Interventions RCT (Karyotaki et al. 2015)

Smoking
- Quitting via web-based and/or phone (Nash et al. 2015)
- Web-based quitting (Strecher et al. 2008)
- Mobile app for cessation (Ey et al. 2015)

Alcohol Consumption
- Adherence & retention for web-based intervention (Murray et al. 2013)
- Web-based game for adolescents (Jander et al., 2016)

Physical Activity and Nutrition
- Web based weight loss program (Svensson et al. 2014)

(Svensson et al. 2014)

Inequality in Effectiveness: Clinical Informatics Interventions
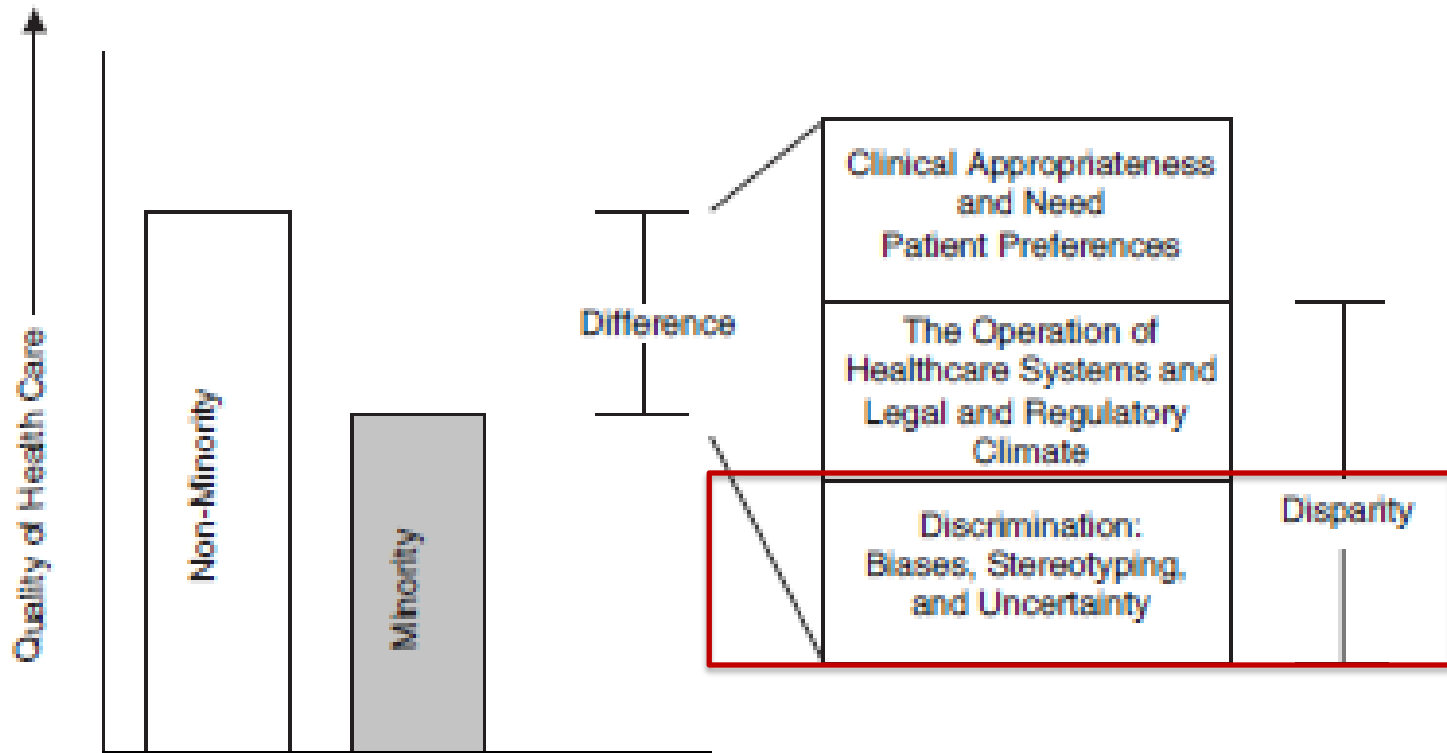
FIGURE S-1 Differences, disparities, and discrimination: Populations with equal access to healthcare. SOURCE: Gomes and McGuire, 2001.

(Gomes & McGuire, 2001)

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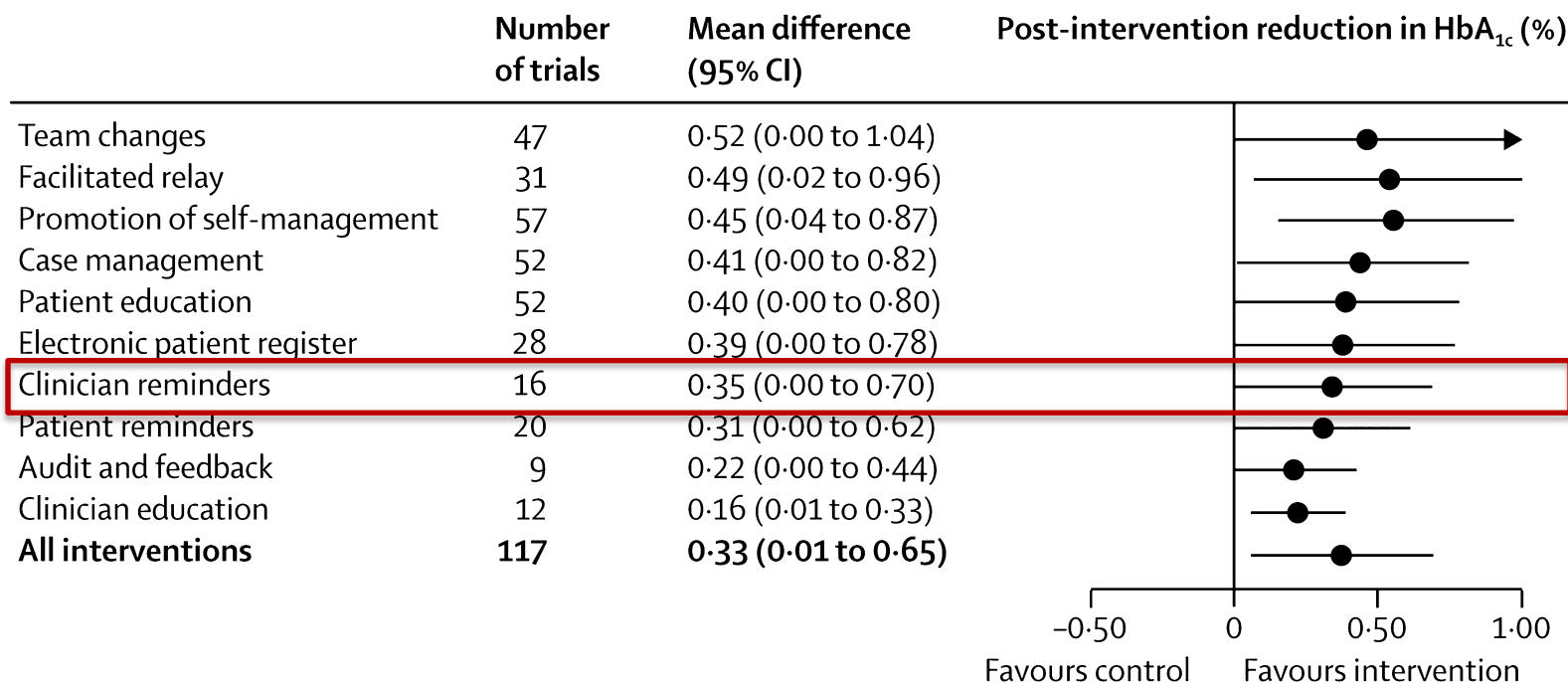
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Inequality in Effectiveness: Clinical Informatics Interventions

- Informatics intervention strategies for reducing disparities
  - Prompting actions
  - Default care processes
  - Provider self-regulation

Prompting via reminders

- ## Prompting via Reminders – Average Effects in Diabetes Care

	Number of trials	Mean difference (95% CI)	Post-intervention reduction in HbA$_{1c}$ (%)
Team changes	47	0·52 (0·00 to 1·04)	
Facilitated relay	31	0·49 (0·02 to 0·96)	
Promotion of self-management	57	0·45 (0·04 to 0·87)	
Case management	52	0·41 (0·00 to 0·82)	
Patient education	52	0·40 (0·00 to 0·80)	
Electronic patient register	28	0·39 (0·00 to 0·78)	
Clinician reminders	16	0·35 (0·00 to 0·70)	
Patient reminders	20	0·31 (0·00 to 0·62)	
Audit and feedback	9	0·22 (0·00 to 0·44)	
Clinician education	12	0·16 (0·01 to 0·33)	
All interventions	**117**	**0·33 (0·01 to 0·65)**	

−0·50   0   0·50   1·00

Favours control   Favours intervention

(Tricco et al., 2012)

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Prompting via reminders

- Race, gender and equity effects for diabetes care:

  - Prompting screening actions – 3 studies:

    - Screening for smoking, diabetes, cancer – may favor disparity groups (1 study) or have no effect (2 studies)

      (Cato, Hyun & Bakken, 2014; Mishurish & Linder, 2014; Zera et. al, 2015)

  - Prompting treatment actions – 2 studies:

    - Neutral or mixed effects on equity in process outcomes

    - No impact on intermediate health outcomes

      (Jean-Jacques et. al, 2011; Hicks et al., 2008)

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Default care processes: Order sets, care pathways

Differential Effects	Disparity Group	Intervention Description	Study Type	Setting	Outcome(s)	Citation
Positive Effect (Targeted Intervention)	South Asian Immigrants Low SES (Medicaid)	Order Sets (Culturally tailored), Alerts (Used less: Registries, Feedback)	Stepped-wedge quasi-experiment	14 primary care practices	Treatment Effects: Practice Level: Improvement in BP control Medicaid patients: Reduction in SBP and DBP	(Lopez et. al, 2019)
Positive Effect (Targeted Intervention)	Cambodian Immigrants and Refugees	HIT mental health screening and care pathway	CRCT	18 primary care providers	Treatment Effects: Increased depression and PTSD diagnosis More guideline-concordant and trauma-informed care	(Sorkin et. al, 2019)

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Provider Self-Regulation

- Audit & Feedback – Average Effects in Diabetes Care

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Audit and Feedback

Differential Effects	Disparity Group	Intervention Description	Study Type	Setting	Outcome(s)	Citation
Favors advantaged groups	White vs. Blacks White non-Hispanic vs. Hispanic Low SES	Population and practice-level comparative feedback, Registries	Descriptive, No control group	198 primary care practices	Favors Whites: BP Control Favors non-Hispanics: BP control Favors high SES: BP control	(Fortuna et. al, 2018)

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Conclusion

- Health informatics interventions pose risks of intervention-generated inequalities
    - May emerge at four stages

- Clinical technologies have mixed impacts on healthcare disparities, and some make them worse

Recommendations

- Collaborative research that involves health disparity communities
- More computational-social science collaboration to inform intervention design
- Systematic study of equity effects of technologies, with comparisons of approaches
  - e.g., universal vs. targeted, impacts on different groups