What is the role of ICTs in addressing health outcomes and limitations from socio-economic status?

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ABSTRACT

While access to information and communication technologies (ICTs) have been touted as a key determinant for human development, few studies have investigated how ICT implementations assist people with low socioeconomic status (SES) and the impacts this might have on health outcomes. This paper investigates the relation between having access to ICTs, health outcomes, and SES. The association between socioeconomic affluence and health is even recognized by policymakers, which suggests that there is an association between SES status and health. This paper addresses the gap in the literature by investigating the research questions: 1) what is the relation between access to ICTs and fair or poor health? 2) Is there a relation between access to ICTs and socio-economic status? The findings illustrate that having less access to ICTs is related to individuals more frequently reporting fair or poor health and having less access to ICTs relates to low SES communities that are in poverty, have lower education rates, have a high number of uninsured people, have people who experience more physical distress, and live in rural areas. A key contribution is that access to ICTs does have a correlation to health and that access to ICTs have a relation to low SES. This means that ICTs can help people access resources to assist with poverty, insurance, education, physical distress, and people who live in rural populations can take advantage of ICTs to help them lead the lives they choose to live.

Keywords: Development as freedom, socioeconomic determinants of health, socioeconomic status, mHealth, freedoms,

INTRODUCTION

Socioeconomic Status (SES) is a concept determined by factors, such as income, educational attainment, and occupation (Adler, 2002; CDC, 2018; APA, 2020; Clarke et al. 2021). Many researchers have concluded that SES is a prominent predictor of health (Marmot, 2007; Marmot, 2003; Stansfeld & Marmot, 1998; Singh-Manoux et al., 2003; Phelan, 2004; Pamuk et al., 1998; Pampel et al., 2010; Clarke et al. 2021). For example, trends in life expectancies are directly related to educational attainment and annual income rates (Marmot, 2007). mHealth is a "medical and public health practice supported by mobile devices, such as mobile phones, patient monitoring devices, personal digital assistants (PDAs), and other wireless devices" (WHO 2011). Using mHealth as another way to learn or practice a healthy lifestyle, is becoming more popular. This means that it is another way health information can be communicated or distributed to the public. Thus, enabling people to live happier and healthier lives. (Clarke et al. 2021).

Socioeconomic determinants of health (SDOH) are factors such as, education level, economic assets, occupational class, race, religious affiliations, gender, geographical location, age, disability, sexual orientation, and other factors relevant to the particular setting that can impact a person's health or access to get health care. (Georgsson & Mattias, 2016; Marmot, 2007; Adler & Ostrove, 1999; Qureshi, 2021). Information and communication technology (ICT), when thoughtfully implemented, can address the gaps created by financial, social, and distance between health professionals and their patients (Deitenbeck, 2018; Negash, 2018; Clarke et al., 2021). Additionally, when underrepresented communities' behaviors, perceptions, aspirations, and needs are considered, access to culturally relevant ICT can improve one's opportunities. (Smith et al., 2014; Deitenbeck et al., 2018; Negash, 2018; Clarke et al., 2021

At a worldwide level, recent research has found a significant correlation between the SDOH and health equity in relation to mHealth access (Qureshi & Xiong, 2019, ab; Clarke et al., 2021). There is a substantial positive link between mHealth, social inequalities in life expectancy, and Human Development education on a worldwide scale. Also, there is a significant relationship between mHealth, social inequalities in the provision of healthcare, and human development outcomes. Clarke et al. (2020), showed that in a patient-centered view mHealth has an impact on age and gender, specifically, young adults and women (Clarke et al., 2020; Clarke et al., 2021).

This research builds upon these studies by drawing upon the Development as Freedom framework, developed by Amartya Sen (Sen 2001). Sen lists freedoms which are considered abilities that all people should have. Using the capability approach, we operationalized the choice framework used by Kleine (2010) to investigate the opportunity to use mHealth applications can enable a person to take more ownership of their health (Qureshi, 2020; Clarke et al., 2016; Clarke et al., 2020) If a person has poor health, it impacts all their other freedoms. (Sen, 2001) Therefore, we are looking at the correlation between access to mHealth tools within a given community and the health outcomes of a community. While research has been conducted on mHealth and countries that are dealing with poverty, there has been a lack of research done about how mHealth might impact a midwestern city in the United States. Little is known about how ICT implementations assist people with low SES and the impacts this might have on health outcomes. This paper considers social opportunities and economic facilities such as poverty, food limitation, and health. The freedoms of health inequities are "where inequalities in health are avoidable, yet are not avoided," (Marmot, 2007). The association between socioeconomic affluence and health is even recognized and accepted among lay members of society. This widespread recognition, however, oversimplifies how strong the association between SES status and health truly is. This paper addresses the gap in the literature by investigating the research questions: 1) what is the relation between access to ICTs and fair or poor health? 2) Is there a relation between access to ICTs and SES?

CHOICE FRAMEWORK AND CAPABILITY APPROACH

In Kleine (2010), the choice framework from Alsop and Heinsohn (2005) was operationalized (Kleine, 2010; Alsop & Heinsohn, 2005). This framework has been noted by Heeks (2010) as being a groundbreaking adaptation of the Sen capability approach. Amartya Sen's capability approach notes five "freedoms" or abilities that people should have: "(1) political freedom, (2) economic facilities, (3) social opportunities, (4) transparency guarantees and (5) protective security" (Sen, 2001). Political freedom is interpreted as the ability to participate in political decisions, such as voting, protesting, etc. Social opportunities are chances for people to access healthcare to achieve valued aspects. For example, this could be a person using an mHealth app in order to target their health goals. (Sen, 2001). Kleine notes a person who is not able to travel, using the Internet to explore places that they want to explore. (Kleine, 2010). The

opportunity to use mHealth applications can enable a person to take more ownership of their own health. (Qureshi, 2020; Clarke et al., 2016; Clarke et al., 2020) Transparency guarantees are the trust people have in the government and the clarity provided to them in order to root out corruption. Finally, the protective security, people have the right and ability to select the security of their data. (Sen, 2001).

The choice framework is shown in Figure 1 below. Sen's capability approach was adapted by showing the interconnectedness of the abilities people should have. The ones specifically associated with or most researched with respect to mHealth are social opportunity and economic facility. These abilities are connected because the less money or economic facility one has, the harder it is for them to have access to social opportunities.

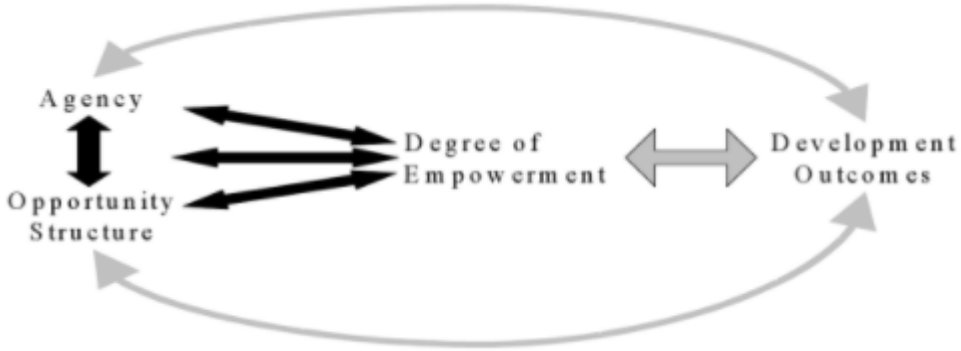


Figure 1 Choice Framework (Alsop & Heinsohn, 2005)

Our first research question targets the left side of the choice framework concerning the development outcomes. Our first research question was what is the relation between ICT access and fair or poor health? This targets whether there is a need for low SES people to improve their health. Our second research question looks at the agency and opportunity structure connection. Our second research question is: Is there a relation between access to ICTs and socio-economic status? In order to operationalize the choice framework opportunities are operationalized as the following: educational resources, psychological resources, information, financial resources, cultural resources, social resources, natural resources, material resources, geographical resources, health, age, gender, ethnicity. These are socioeconomic determinants of health.

SOCIOECONOMIC DETERMINANTS OF HEALTH

SES factors are factors such as income, occupation, and education. were used to explain that health is directly impacted by income and occupation (Adelman, 2008; Fuentes-Afflick, E., 2021). Marmot explained that "[the] lower the grade of employment, the higher the risk of heart disease [and] every major cause of death." (Adelman, 2008). This relationship between SES factors and health outcomes is publicly recognized as many can see from the beginning of the recent health crisis (Qureshi, 2021).

Distribution of health resources has not been shown to be significant to health equity (Sen, 2003; Marmot, 2007; Braveman, 2003; Braveman, 2011; Clarke et al., 2021). Health equity occurs when all persons along the social gradient share in the social opportunities to have healthy achievements (Braveman, 2003; Sen, 2002; Clarke et al., 2021). As a concept, health equity is the opportunity to be healthy separate from preexisting ailments. It is the opportunity for an individual to achieve the best level of physical and mental wellbeing that their biological limits will allow. (Braveman, 2003; Clarke et al., 2021). As a result, a person who has the capability to improve their health, but refuses, does not suffer from health inequity. Whereas, a person who is unable to establish healthy habits or seek medical care as a result of social opportunities or SES, has not been provided the opportunity to achieve their optimum level of physical or mental wellbeing. (Sen, 2002; Sen, 2001; Clarke et al., 2021). Healthy behaviors, although they impact one's health are not necessarily direct determinants of health inequity. In some circumstances, such as when researchers are considering low SES, healthy behaviors or unhealthy behaviors show another aspect of not being capable of sustaining a healthy lifestyle. (Sen, 2001).

Four major SES factors: healthcare, environmental exposures, lifestyle, and health behaviors serve as a proxy for health outcomes (Adler & Newman, 2002; Clarke et al., 2021). In areas where people of low SES live, there are fewer primary care doctors per capita. (Shi & Starfield, 2000; Blumenthal & Kagen, 2002; Fuentes-Afflick, E., 2021; US Dept. of Health and Human Services, 2017). Therefore, lower SES people are less likely to receive preventative screenings or specialty care (Dunlop, 2000; Blumenthal & Kagen, 2002; CDC, 2018; Clarke et al., 2021). People with low-income are more likely to be uninsured, though the Affordable Care Act (ACA) has increased the number of insured people (Monheit & Primoff Vistnes, 2000; Fuentes-Afflick, E., 2021; US Dept. of Health and Human Services, 2017) Compounding together low SES

people are more likely to receive poorer quality of care, when they do seek medical care due to the previous facts (Hafner-Eaton, 1993; Fuentes-Afflick, E., 2021; US Dept. of Health and Human Services, 2017). In addition, funding is normally given to health resources that treat diseases instead of funding to projects that attempt to modify predisposing factors, such as environmental and behavioral risks; (Adler & Newman, 2002) all of which disproportionately affect less affluent communities. (Clarke et al., 2021).

SOCIAL OPPORTUNITIES AND ECONOMIC FACILITIES

People who have a lower education level and lower-income level are considered low SES. Economic facilities are not only the economic growth, they are the income differences and how it inhibits options in various situations. (Sen, 2001). Economic growth helps address absolute poverty. The increase in human capital and development raises the income of people living below a certain income level (Heeks, 2017; Goldin, 2016; Nafukho, 2004). For people living in poverty, this is an income under $25,000 per year. (US Census, 2018). Of course, people who are living in poverty could start their micro-enterprise to raise their yearly income. However, only 20% of micro-enterprises survive in the United States. Most people in poverty make money by working for a company. (Heeks, 2017) However, people who are low SES tend to have jobs with more frequent and consistent job strain and a lack of control over their duties as an employee (Marmot et al., 1997; Price, 2002; Fuentes-Afflick, E., 2021; US Dept. of Health and Human Services, 2017). Workers with low SES tend to be more exposed to higher occupational injury risks and higher exposure to toxic substances on the job (CDC, 2018; Adler & Newman, 2002). This is an example of how freedoms of economic facilities can impact freedoms of social opportunities. (Sen, 2001)

Those who are in low SES populations are more likely to live near highways, industrial areas, and toxic waste sites leading to poorer housing quality, greater residential crowding, and prolonged noise exposure (Evans & English, 2002). Prolonged noise exposure leads to poorer long-term memory, reading deficits, and hypertension (Adler & Newman, 2002; Fuentes-Afflick, E., 2021), which can affect one's educational attainment and strengthen the likelihood of intergenerational poverty. Low SES populations are also more likely to experience isolation and lack engagement in social networks (Putnam, 2000; Sampson et al., 1997; Smith, 2008; Fuentes-Afflick, E., 2021) which may increase the risk of higher levels of stress leading to a higher risk of

hypertension (Momtaz et al., 2012; Steptoe et al., 2004). This shows the ability of social opportunities and the effect it has on health. Freedoms and freedoms are vicious circles that constantly impact each other. The effects of the exposure can affect memory and education attainment, which makes it harder for one to navigate the healthcare they will most likely need. This shows an impact on transparency guarantees. (Sen, 2001).

Areas with low SES populations are less likely to have access to affordable fresh fruits, vegetables and lean meats, (Pampel 2010, CDC 2018) and tend to lack well-lit and safe areas for outdoor exercise (Adler and Newman 2002, CDC 2018, Calderon 2006). These are all choices a person makes with regard to their health. However, the fact that they are less accessible to those of a different social group show an ability that impacts health outcomes. Unhealthy behaviors such as "cigarette use, high-fat diets, and lack of exercise" (Adler & Newman, 2002) is linked to low SES. (Adler & Newman, 2002). This could be due to education on the risks of substance abuse, such as alcohol, tobacco, or drugs which are less prominent in low SES areas. (Pamuk et al. 1998; Fuentes-Afflick, E., 2021; US Dept. of Health and Human Services, 2017). Furthermore, smoking-cessation treatment is not often covered by insurance (Pamuk et al. 1998). Thus, further impacting one's freedoms and one's ability to stay healthy. (Sen, 2001).

MOBILE HEALTH (MHEALTH)

While a standardized definition has yet to be established, mHealth is largely understood to be a "medical and public health practice supported by mobile devices, such as mobile phones, patient monitoring devices, personal digital assistants (PDAs), and other wireless devices" (WHO 2011). The use of mHealth in health practices is a relatively new tool. mHealth is being adapted more frequently by health service providers and patrons alike as it has already shown compelling potential for addressing the SES factors of health and offers its users the opportunity to monitor their health rather than depending solely on input from health care professionals (WHO 2011, Deitenbeck et al, 2018, Negash 2018).

Mobile healthcare applications are helping people become healthier and may potentially bridge the gap among rural and remote communities. By 2012, at least 40,000 health-related apps were available to download to help people research and manage their health (Boulos et al., 2014; Qureshi, Xiong, & Deitenbeck, 2019). These apps ranged from chronic disease management, ability to access relevant health care information, exercise and food intake tracking, follow-up

care, and basic diagnostics for minor medical issues (Silvia et al., 2015; Qureshi, Xiong, & Deitenbeck, 2019). Worldwide, over 85% of the population has mobile-cellular signal coverage (ITU, 2017; Qureshi, Xiong, & Deitenbeck, 2019; Clarke et al., 2021). According to the International Communications Union (ICU), in 2017, an estimated 103.5 per 100 inhabitants had a wireless subscription. This is up from 33.5 per 100 inhabitants in 2005. In addition, the growth is even more impressive in the least developed countries (LDCs) from 5.0 in 2005 to 70.4 (estimated) in 2017 (International Communications Union, 2017; Qureshi, Xiong, & Deitenbeck, 2019; Clarke et al., 2021).

Low-income and rural communities that may be unable to consult a healthcare professional because of monetary or travel constraints might benefit from the ability to utilize mHealth to monitor their health. (Bolin, 2015; Deitenbeck et al., 2018). To be sustainable, mHealth developers must examine and observe how their tool is built, utilized, and perceived by users. (Negash, 2018). For all countries in the world, Qureshi and Xiong (2019a) found a significant relationship between mHealth, social inequalities in life expectancy, and in education on human development. Their research showed a significant relationship between mHealth, social inequalities in the provision of healthcare, and human development outcomes. In another study, they found that there is a strong positive correlation between the socioeconomic determinants of health on health equity in relation to mHealth use at the global level (Qureshi and Xiong 2019b). On a more local level, Clarke et al. (2016) found mHealth can help inform patients and therefore increase the speed of diagnosis. (Clarke et al., 2016). They also found in a later study that younger adults and women found mHealth useful (Clarke et al. 2020). This shows that mHealth is being used to target different demographics to not only access healthcare but help people make decisions about their healthcare.

METHODOLOGY

DATA

The sources of data collection and their authority are as follows: the Center for Disease Control and Prevention (CDC), which serves as the leading authority in public health and research in the United States, the US Census Bureau, the principal U.S. Federal Statistical System, and County Health Rankings, which collects and organizes U.S. health and socioeconomic

determinants of health data on the state and county level (CDC, 2018; County Health Rankings, 2019; U.S. Census Bureau, 2010; U.S. Census Bureau, 2013-2017; U.S. Census Bureau, 2018). This data was collected on the county level to understand health trends in the 93 counties of Nebraska. The variables, sources, and definitions are included in the table below:

TABLE 1: CONCEPTS, VARIABLES, DEFINITIONS, AND SOURCES

Concept	Variables	Definition	Source
Demographics	White, not White	These are all percentages of respondents separated based on their race.	(County Health Rankings "Nebraska", 2019)
	Not proficient in English	Percent of population not proficient in English	
Socioeconomic Status	Economic facility variables: income, income inequality, poverty, and unemployed.	Income is the median household income for county. Income inequality was the Gini index. Poverty and Unemployment are the percentages of people living in poverty and unemployed.	(County Health Rankings "Nebraska", 2019)
	Other variables: No Insurance, and Less Education	These are all percent of the population. Less college is the percent of population who are greater than 25 years old and don't have a 4 year degree.	
Environmental Factors	Food Limit, Food Environment, Air Pollution, Water Violations, and Hospitals	Food Limit is the percent of population with limited access to healthy foods. Food Environment is an index of factors that contribute to healthy food access. Air Pollution is the average density of fine particulate matter in mg/m^3. Water Violations are the presence of water violations in the county. Hospital is the number of hospitals in the county.	(County Health Rankings "Nebraska", 2019; CDC, 2020)
Healthy Behaviors	Smoke Drinking Obesity, Sleep, and Physical Distress	Smoking are the percent of adults who are current smokers. Drinking is the percent of adults reporting binge or heavy drinking.	(County Health Rankings "Nebraska", 2019)
Health Outcomes	Fair Poor Health	Percent of population reporting fair and poor health. This will be the main dependent variable for health outcomes.	(CDC, 2020)
mHealth Access	No Access to ICTs as a percent	Percent of estimated population without any access to Internet. This was calculated by taking the No Access divided by the Total.	(US Census Bureau, 2020)

A bivariate correlation test was conducted between all of the collected variables to distinguish which variables were significantly correlated with one another on both the .001 and

.05 p-value levels. After all significant correlations had been determined, linear regression tests with controls for all significantly correlated variables were conducted.

Hypothesis 1: No access to ICTs will be positively related to Fair Poor Health. This means that where is less access to ICTs there are higher amounts of people considering their health fair or poor.

The first question focuses on the relation between access to ICTs and health outcomes. For mHealth to be a useful tool there must be adequate access. Otherwise, those who need the health resources, will not be able to access them via mHealth applications. This question however focuses on connecting access to ICTs (agency section of the choice framework) and health outcomes.

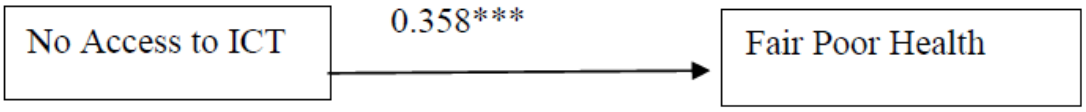
Hypothesis 2: No access to ICTs will be positively related to socioeconomic determinants of health. This means when there is limited access to ICTs the people in that area will be less education, more mental distress, physical distress, sleep deprived, income inequality, unemployed, poverty, having no insurance, people with limited English proficiency, people who are non-white, rural, food insecure, exposed to more air pollution, exposed to more water violations, less hospitals, and heavy drinking. This addresses our second research question.

RESULTS AND ANALYSIS

Analysis for Hypothesis 1

For the first research question, we used a regression analysis and found the percent that were estimated not to have access to any internet or smartphone devices had poorer health than those with access. This shows the relation in the choice framework where Agency connects with Outcomes (beta score 0.358 and p-value <0.005). This is illustrated in the following figure 5:

Figure 5: ICT Access to Health



This confirms our first hypothesis. The access one has to ICT is related to having high fair or poor health days. This is not causation, but a relation. It could be that other factors are causing more ICT access and lower fair poor health days. As stated above, low SES populations might be the invisible factor here. The people that have might have worse health and due to their situation

and daily stress do not have access to mHealth. To understand this relation more research could be done to see the types of mHealth interventions and how they relate to fair/poor health.

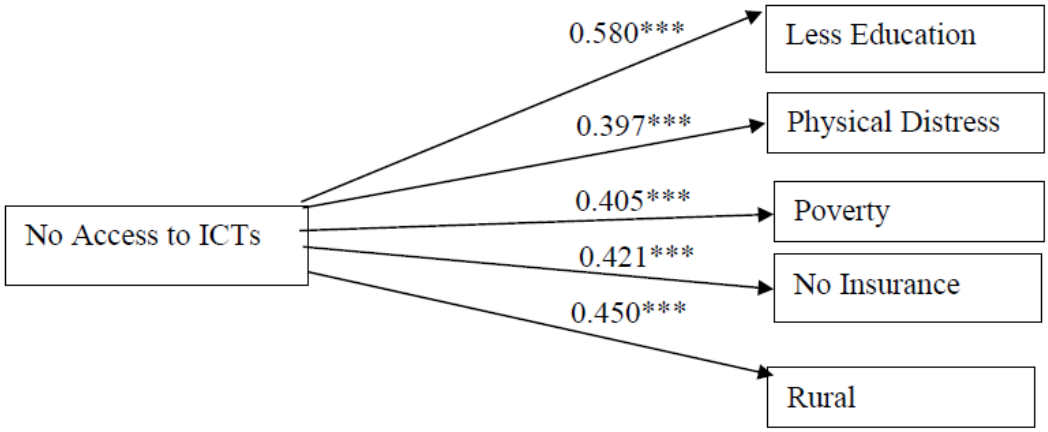
Analysis for Hypothesis 2

We found that when there is limited access to ICTs is not significantly linked to more mental distress, sleep deprived, income inequality, obesity, unemployed, food insecure, people with limited English proficiency, non-white, and places with less hospitals. This shows that demographics and some healthy behaviors are not related to ICTs. This makes sense because mental health uses with mHealth is relatively new. In the US many people don't use ICTs to change their income, unemployment, or food insecurity. An area having less hospitals compared to less access to ICTs was a significant value of 0.009. This is a surprise because we believed that levels of infrastructure would impact ICT use and in this aspect, it does not.

On the other hand, figure 6 shows that having less access to ICTs is significantly related to less education, physical distress, poverty, having no insurance, and living in rural areas. Less access to ICTs and less education were significantly related (beta score 0.580 and p-value <0.005). According to the R squared value , 32.9% of the values matched this trend. This shows that the more uneducated people, there are the less access to ICTs that area will have. Clarke et al. (2016) discussed how the skills of ICTs impacted the usefulness of ICTs. Therefore, ICTs and mHealth might be less useful just on the fact that they are not readily available or often used. (Clarke et al., 2016).

Less access to ICTs and more physical distress were found to be related (beta score 0.397 and p-value <0.005). Upon further analysis we found that this was not the case for less access to Internet. This means that it's not an infrastructure problem. It is a problem based on the actual access to phones, computers, or other devices that can access the internet. This could be related to poverty which we also found was positively related to no access to ICTs (beta score 0.405 and p-value <0.005). This is illistrated in figure 6:

Figure 6: ICT Access effect on Socio-Economic Factors



Similarly, we found that people having no insurance was related to having less access to ICTs (beta score 0.421 and p-value <0.005). More people with no insurance were related to having less access to ICTs. This means that mHealth, such as, telehealth and other mHealth that connects doctors to people who have limited insurance, have relevant applications. Finally, rural populations are related to having less access to ICTs (beta score 0.450 and p-value <0.005). Since this data is from Nebraska where there are many rural counties in the west, but a few urban counties in the east, this could show a difference in eastern and western counties.

In the second hypothesis, we predicted that when there is limited access to ICTs, the people in that area will be less educated, experience higher mental distress, physical distress, sleep deprived, income inequality, unemployment, poverty rates, having no insurance, people with limited English proficiency, people who are non-white, rural, food insecurity, exposed to more air pollution, exposed to more water violations, less hospitals, and more heavy drinking. This was predicted by the choice framework and confirmed by the data for the following factors: less education, more physical distress, more impoverished people, more people with no insurance, and people living in rural populations. Thus, as Kleine (2010) showed with the choice framework the opportunities one has affect the outcomes too.

IMPLICATIONS FOR RESEARCH AND PRACTICE

The above analysis suggests ICTs to be used for mHealth must not be a substitution for health behaviors. They should improve effectiveness and efficiency (Heeks, 2010; Hevner et al., 2004). Also, in terms of the analysis, we only looked at the agency, opportunity structure, and outcomes. We did not specifically test to see whether ICTs were empowering people to lead healthier lives in the US. (Kleine, 2010; Alsop & Heinsohn, 2005). This has implications for policymakers in local communities where government services are limited. Our research points to the following recommendations:

1. Investments targeting the use of ICTs – mobile broadband for education and training purposes can potentially alleviate distress facing people living in low SES communities.
2. Poverty can be alleviated through targeted investments in ICT infrastructure in low SES communities. Our findings suggest that it is important to offer specific interventions in low SES communities connected to accessing the resources they need through the ICTs. In particular, individuals with low SES in rural communities tend to be isolated from the resources they need to stay healthy. This means that mHealth can be a resource to connect doctors and trained medical people to isolated individuals in rural populations.
3. The most significant findings of this research show that lack of access to ICTs affect the number of days someone in a community is afflicted with fair or poor health. This means that local government interventions in offering health services need to be connected to ICT infrastructure.

Many researchers have shown this abroad using similar methods. Now we have shown this to be true locally. We have shown that health is related to socioeconomic determinants of health and ICTs. If mHealth applications are developed in an accessible fashion, the impacts on people's freedoms and development might be significant.

SUMMARY, CONCLUSIONS AND LIMITATIONS OF THIS RESEARCH

This paper investigates locally the relation between having access to ICTs, health outcomes, and socio-economic status. Our findings are that having less access to ICTs is related

to having more days of fair or poor health. Another finding is that having less access to ICTs relates to communities that are in poverty, have lower education rates, have a high number of uninsured people, have people who experience more physical distress, and live in rural areas.

A key contribution is that access to ICTs does have a correlation to health. The first hypothesis was similar but instead of addressing opportunities addressed agency. Agency is the capability to do something such as track your health data on a mHealth app. The fact that access to ICTs but not access to Internet shows that while there is a relationship between access to ICTs and fair or poor health, there might be other factors influencing that relation. This must be further researched.

Another contribution is that access to ICTs has a relation to low SES people by helping them address their poverty. People who are uninsured, people who are less educated, people who are physically distressed, and people who live in rural populations can take advantage of ICTs to help them lead the lives they choose to live. This shows that while not significantly related to other healthy behaviors access to ICTs is related to those who are physically distressed. Those communities that are more physically distressed as discussed previously tend to also be low SES communities (Evans & English, 2002; Adler & Newman, 2002; Putnam, 2000; Sampson et al., 1997; Smith, 2008; Fuentes-Afflick, E., 2021; US Dept. of Health and Human Services, 2017). As we predicted, low SES such as people who are less educated, people who live in poverty, and people who are uninsured have less access to ICTs. Though much of the literature was older, this shows a problem that has been present for a long time. (Shi & Starfield, 2000; Blumenthal & Kagen, 2002; Monheit & Primoff Vistnes, 2000; Hafner-Eaton, 1993; Adler & Newman, 2002; Fuentes-Afflick, E., 2021; US Dept. of Health and Human Services, 2017).

Limitations of this research are that we did not look at people's desires or comparable applications. Every generation has its workout videos and diet trend, mHealth could just be a fad that doesn't necessarily impact development or impact one's freedoms. Further research is needed to understand how such ICTs can be used to access and harness the resources of those who live in low SES communities. In addition, research would be required to collect data in low SES communities using the constructs developed in this paper.

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APPENDIX

Link to see data: https://github.com/lgkiemde/Aggregated-Data.git

Regression Analysis for No English compared with Fair Poor Health

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	65.337	1	65.337	25.662	.000
Residual	231.695	91	2.546		
Total	297.032	92			

The independent variable is NoEng.

Regression Analysis for Non-White compared with Fair Poor Health

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	78.442	1	78.442	32.655	.000
Residual	218.591	91	2.402		
Total	297.032	92			

The independent variable is NonWhite.

Regression Analysis for Poverty compared with Fair Poor Health

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	68.082	1	68.082	27.060	.000
Residual	228.950	91	2.516		
Total	297.032	92			

The independent variable is Poverty.

Regression Analysis for Unemployed compared with Fair Poor Health

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	32.815	1	32.815	11.302	.001
Residual	264.217	91	2.903		
Total	297.032	92			

The independent variable is UnEmploy.

Regression analysis for No Insurance compared with Fair Poor Health

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	147.374	1	147.374	89.611	.000
Residual	149.658	91	1.645		
Total	297.032	92			

The independent variable is NoInsurance.

Regression analysis for Less Education compared with Fair Poor Health

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	38.839	1	38.839	13.689	.000
Residual	258.194	91	2.837		
Total	297.032	92			

The independent variable is LessCollegeC.

Regression analysis for Drinking compared with Fair Poor Health

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	36.514	1	36.514	12.755	.001
Residual	260.518	91	2.863		
Total	297.032	92			

The independent variable is Drinking.

Regression analysis for Obesity compared with Fair Poor Health

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	37.954	1	37.954	13.331	.000
Residual	259.079	91	2.847		
Total	297.032	92			

The independent variable is Obese.

Regression analysis for Smoking compared with Fair Poor Health

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	155.303	1	155.303	99.715	.000
Residual	141.730	91	1.557		
Total	297.032	92			

The independent variable is Smoke.

Regression analysis for Physical Distress compared with Fair Poor Health

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	230.562	1	230.562	315.650	.000
Residual	66.470	91	.730		
Total	297.032	92			

The independent variable is PhysicalDistress.

Regression analysis for Sleep compared with Fair Poor Health

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	69.969	1	69.969	28.042	.000
Residual	227.063	91	2.495		
Total	297.032	92			

The independent variable is Sleep.

Regression analysis for No Access to ICTs compared with Fair Poor Health

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	38.005	1	38.005	13.352	.000
Residual	259.027	91	2.846		
Total	297.032	92			

The independent variable is NoAccessPercent.

Regression analysis for No Access to ICTs compared with Less Education

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	872.215	1	872.215	46.069	.000
Residual	1722.886	91	18.933		
Total	2595.101	92			

The independent variable is NoAccessPercent.

Regression analysis for No Access to ICTs compared with Physical Distress

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	119.581	1	119.581	17.885	.000
Residual	608.438	91	6.686		
Total	728.019	92			

The independent variable is NoAccessPercent.

Regression analysis for No Access to ICTs compared with No Insurance

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	119.581	1	119.581	17.885	.000
Residual	608.438	91	6.686		
Total	728.019	92			

The independent variable is NoAccessPercent.

Regression analysis for No Access to ICTs compared with Poverty

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	390.111	1	390.111	19.547	.000
Residual	1816.109	91	19.957		
Total	2206.220	92			

The independent variable is NoAccessPercent.

Regression analysis for No Access to ICTs compared with Rural

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	18154.497	1	18154.497	23.082	.000
Residual	71572.755	91	786.514		
Total	89727.252	92			

The independent variable is NoAccessPercent.