

Article

Linking Food and Resource Access to Medical Care Access in Maputo, Mozambique

Cameron McCordic *, Bruce Frayne  and Naomi Sunu

School of Environment, Enterprise and Development, University of Waterloo, Waterloo, ON N2L 3G1, Canada; bfrayne@uwaterloo.ca (B.F.); nsunu@uwaterloo.ca (N.S.)

* Correspondence: c2mccord@uwaterloo.ca

Abstract: Background: Rapid urbanization coupled with evolving threats from both communicable and non-communicable diseases underscore the vulnerability of urban healthcare systems. Building resilient healthcare systems and increasing access to socioeconomic resources is key for achieving sustainable development goals (SDGs). The city of Maputo (Mozambique) provides a helpful case study for the analysis of this situation. Methods: This investigation analyzes household survey data to determine the predictors of consistent household medical care access (SDG 3) in Maputo. Using those identified predictors, the study identifies key segments of households in Maputo that are vulnerable to disease given their inconsistent access to medical care. Results: The results indicate that households with inconsistent medical care access (SDG 3) also suffer from severe food insecurity (SDG 2) and inconsistent access to a cash income (SDG 8), water (SDG 6), and electricity (SDG 7). Conclusions: This study identifies challenges to the achievement of SDG 3 in Maputo, where households that are likely to need medical care under the strain of impoverished living conditions are also the least likely to have consistent access to needed medical care.



Citation: McCordic, C.; Frayne, B.; Sunu, N. Linking Food and Resource Access to Medical Care Access in Maputo, Mozambique. *Sustainability* **2021**, *13*, 8174. <https://doi.org/10.3390/su13158174>

Academic Editors: Marian Rizov and Iris Vermeir

Received: 26 May 2021

Accepted: 19 July 2021

Published: 21 July 2021

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Copyright: © 2021 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

Keywords: urbanization; medical care access; food security; resource access

1. Introduction

Human settlements have become increasingly urban, and this transition is likely to accelerate in Asia and Africa [1–3]. These Global South regions currently have the most population and urban growth [4]. Despite the economies of scale associated with urbanization [5], many cities in the Global South have become host to sprawling informal settlements and widespread poverty [6,7]. Limited urban planning and governance in many growing secondary cities have hampered the potential of urbanization to translate into improved socio-economic well-being [2,8,9]. As a result, urban growth in Africa has coincided with hunger and malnutrition and the potential for longwave epidemiological hazards [10,11]. Urbanizing societies undergo transitions in health and disease patterns; however, cities in the Global South are facing epidemiological hazards which are evolving rapidly under the strain of monumental transitions [12].

Cities, by virtue of being home to numerous people and socioeconomic activities, are vulnerable to widespread impact of diseases. At the time of writing, the world is facing the unprecedented challenge of containing the Covid-19 virus. The Covid-19 pandemic has tellingly unveiled the fragility of urban health and wellbeing. For instance, recent studies from the city of Maputo show that households with chronically ill members also experienced food insecurity, as well as inconsistent access to electricity, water, cash income, and medical care [13]. Cities provide critical spaces for jointly addressing socioeconomic and health system vulnerabilities because of the population sizes and demographics [14]. As a result, Mozambique (specifically its capital, Maputo) provides a fertile case study for investigating the vulnerability of urban households to infectious diseases.

It has long been observed that the epidemiological vulnerability profile of humanity has shifted from predominantly communicable to noncommunicable diseases [15]. This

epidemiological transition also mimicked a dietary shift towards sugars and saturated fats, known as the nutrition transition [16]. Among many developing countries, diseases stemming from both under-nutrition and over-consumption have become prevalent [17]. Likewise, under the strain of antimicrobial resistance, infectious diseases are resurging alongside non-communicable diseases [18]. While these transitions conceptually drive an understanding of human development, they are imperfectly suited to support sustainable development in cities of the Global South, where both ends of these transitions have become prevalent. Hence, there is a growing appreciation for the socio-economic factors that might shape the characteristics of both challenges [19–21].

Socio-economic factors are important in shaping these transitions whilst highlighting a third momentous transition. The rapid urbanization that has defined the current urban transition has strained social services in many cities around the world [22,23]. The urgency of these challenges is underscored by the 2015 sustainable development goals (SDGs) which comprise 17 interlinked goals for addressing sustainability challenges together as an “indivisible whole” [24]. Specifically, SDG 3 on health and well-being has 13 targets aimed at reducing mortality and morbidity, and strengthening the capacity of countries to manage health risks in connection with other SDGs [25]. This SDG aligns with calls for a new urban agenda that promotes sustainable cities and provision of necessary infrastructure and equitable access for all [4,23]. Ensuring the health and well-being of all people in society amidst these transitions is key for sustainable development [25].

The city of Maputo, which has experienced rapid population growth in recent decades, provides a revealing case study of this discussion [26,27]. Maputo’s rapid growth has been accompanied by informal growth and a strained system of physical infrastructure [28] (Barros et al., 2014). In many cases, access to electricity (SDG 7), in Maputo is obstructed by the limited extent of the electrical grid, the limited financial capacity of households, and broader bureaucratic delays [29]. Similarly, water access (SDG 6) is often negotiated through a combination of public and private sources, mostly using boreholes [30,31]. The limited accessibility of these resources has also coincided with shocks to household income sources (SDG 8) and food security (SDG 2). A 2008 household survey found that only 43% of surveyed households had access to full-time employment, with most household income stemming from informal or casual sources [32]. Raimundo et al. [32], found that just under a third of surveyed households in Maputo were food secure.

In addition to these socio-economic challenges, households in Maputo have a challenging epidemiological profile. A 2007–2008 national mortality survey [33] found that HIV/AIDS held a mortality rate (per 100,000) of 336.2 and a malaria mortality rate of 132.5. Furthermore, circulatory diseases accounted for a mortality rate of 106.6. A 2006 study also found that traffic hazards had a sizable impact on mortality in Maputo, with 43.7% of injury deaths arising from traffic accidents [34]. Together these mortality characteristics highlight the epidemiological stresses that are borne by households in Maputo and the need for consistent access to medical care.

The healthcare system in Maputo, however, does not necessarily support expedient access for those who need it most. The city’s healthcare system is two-tiered, comprising a public and a private care system for households in the city [35]. Households unable to afford access to the private healthcare clinics in the city can face long wait times and hampered access. The structure of this system underlines the importance of out-of-pocket healthcare expenses. Such costs have the potential to drive households deeper into poverty under times of stress [36]. Thus, the accessibility of healthcare, and the socio-economic characteristics of resource deprivation can be mutually reinforcing. This research highlights a perfect storm for households in the city facing strains arising from both communicable and noncommunicable diseases.

Given this context, household access to medical care seems to be a pivotal step in the pursuit of urban sustainable development and broader community wellbeing in Maputo. That access, however, also appears to be contingent upon household socio-economic characteristics which, in of themselves, limit household resilience under the strain of

communicable and non-communicable diseases. As a result, sustainable development must approach this network of interactions in order to chart mutually reinforcing sustainability activities under suitable local conditions [24,37]. This investigation assesses the extent to which measures of household food insecurity (SDG 2) and limited resource access (SDGs 6, 7, and 8) share a predictive relationship with the consistency of household access to medical care (SDG 8) among sampled households in Maputo. This objective provides insight into the potential network of interactions that links these diverse variables together. Using those identified measures, the investigation then identifies sampled households in the city of Maputo that are particularly vulnerable given the inconsistency of their access to medical care. This objective will identify subsets of the sampled households with inconsistent medical care access.

2. Materials and Methods

2.1. Research Objectives

This Investigation will seek to achieve the following research objectives:

1. Define the relationship between severe food insecurity and inconsistent resource access in predicting the consistency of household access to medical care among the sampled households;
2. Determine the subsets of the sampled households vulnerable to inconsistent medical care access according to food insecurity severity and resource access inconsistency.

2.2. Sample

The household sample under investigation was taken from a Hungry Cities Partnership (HCP) survey of Maputo, Mozambique in October 2014. In this survey, 19 wards were randomly selected across the city of Maputo. Within each randomly selected ward, a team of trained enumerators used systematic sampling to select 2071 households for the survey. The sample sizes were distributed across the randomly selected wards using approximate proportionate allocation according to the most recently available census. When a household was approached for the survey, informed consent to participate in the study was requested from one adult in the household who could confirm that they were knowledgeable about the characteristics and food consumption habits of the household. This HCP survey maintained a memorandum of understanding with the institutional partner in Maputo, Eduardo Mondlane University, and was given ethics clearance by Queen's University.

2.3. Variables

The survey instrument administered in this survey of Maputo included data on the severity of household food insecurity, the consistency of household medical care access in the last year as well as the consistency with which households access other key resources in the last year. The severity with which households experienced food insecurity (relating to SDG 2) was measured using the Household Food Insecurity Access Scale (HFIAS) [38]. This scale measures the frequency and severity of food access challenges that a given household experiences in the previous 4 weeks. The scale measures social, economic, and physical dimensions of food access challenges (ranging in severity) across nine Likert scale questions. The nine Likert scale questions included in the HFIAS are provided below:

1. "In the past four weeks, did you worry that your household would not have enough food?"
2. In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?
3. In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources?
4. In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?
5. In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?

6. In the past four weeks, did you or any household member have to eat fewer meals in a day because there was not enough food?
7. In the past four weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food?
8. In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food?
9. In the past four weeks, did you or any household member go a whole day and night without eating anything because there was not enough food?" [38], p. 5.

Each question is paired with ranked optional answers ranging from no (never) to often (more than 10 times in the previous 4 weeks). The results of the scale can be scored using a scoring algorithm to categorize households according to four categories: food secure, mildly food insecure, moderately food insecure, and severely food insecure. For the purposes of this investigation, this variable has been transformed into a binary variable indicating whether a household was categorized as severely food insecure.

The survey instrument also provided a measure of the consistency of household access to medicine or medical care in the previous year. Households were asked how many times, if any, they went without access to medical care over the past year. This variable was collapsed to provide a comparison of whether households maintained consistent access to medical care in the previous year. In a similar fashion, the survey also gathered data on SDGs 8, 6, and 7 respectively on the consistency of household access to a cash income, enough clean water for home use, and electricity in the home. Each of these variables were collapsed to a binary variable representing whether a household maintained consistent access to each resource in the previous year (Table 1).

Table 1. Variable Descriptions.

Variable	Values	
Medical Care Access	Consistent Access	Inconsistent/No Access
Cash Income Access	Consistent Access	Inconsistent/No Access
Electricity Access	Consistent Access	Inconsistent/No Access
Water Access	Consistent Access	Inconsistent/No Access
Severe Food Insecurity	Not Severely Food Insecure	Severely Food Insecure

The variables included in this investigation were binned for two primary reasons. First, given the survey scales relied upon this investigation (predominantly Likert-scale) and the recall of the survey participants, the binning of the variables likely increased accuracy of the categories. Second, the variable binning aided in the interpretation of the investigation results and allowed for a comparison of unadjusted and adjusted odds ratios. Similarly, the binned variables aided the interpretation of the decision tree designed in this investigation.

2.4. Analysis

Objective one was achieved through the calculation of odds ratios. Odds ratios calculate the change in odds associated with a change from one category to another across two binary variables. In other words, the calculation reveals the change in the odds of a household having inconsistent medical care access given that the household is severely food insecure. The p values for the odds ratio calculations were determined using Pearson Chi-Square Tests. Given the limited number of survey clusters represented in the sampling strategy, it was determined that multi-level modelling may have provided unreliable standard errors in this investigation. Future research should evaluate the findings from this investigation using alternative sampling strategies.

Objective two was achieved using a chi-square automatic interaction detection (CHAID) decision tree. Using the identified predictive variables identified in research objective one,

this analysis identified the percentage of households with consistent access to medical care across subsets of the sample (as determined by the independent variables in this investigation). To achieve this aim, the CHAID decision tree splits the sample into subsets using the variable with the highest chi-square value in a cross-tabulation. The tree then splits the sample according to that variable and then repeats the same process within each subset of the identified variable. This process was continued until less than 10% of the sample was represented in the final parent nodes or less than 5% of the sample was represented in the final child nodes (to avoid over-fitting). The frequency of consistent medical care access was then calculated in each of the nodes identified by the CHAID decision tree. Only households with complete data sets for both the independent and dependent variables were included in this analysis. This analysis was carried out while including the ward of residence for each sampled household in order to identify any potential spatial patterns in the sample sub-setting.

2.5. Limitations

This survey data was collected in 2014 and there is limited new survey data collection that would support the analysis carried out in this investigation. That said, other researchers have more recently indicated that the challenges discussed here around resource access have continued to be a challenge in the city [39,40]. This investigation provides a fascinating case study into the inter-relationships among multiple SDGs and the authors continue to encourage efforts to collect recent and reliable survey data in Maputo to further explore the findings from this investigation. While the household survey underpinning this investigation was designed to be as representative as possible, the limited availability of recent census data (and the logistical constraints hampering true simple random sampling) limit the extent to which the survey findings can be taken as representative of the Maputo population. That said, this investigation does give insight into the potential barriers and challenges that households in Maputo may face when debilitated by illness. Furthermore, the analyses provided in this investigation relied upon binned variables. The decision to bin these variables was taken considering the benefits from trading limited precision for bolstered accuracy in respondent recall. That said, the binning may have masked more nuanced thresholds in these variables. Future research will be needed to investigate that nuance in greater detail. Finally, given the design of this investigation, none of the analyses presented here should be interpreted as causal in nature. Instead, this is a retrospective review of the predictive relationships linking household resource access and food insecurity with the consistency of medical care access.

3. Results

3.1. Research Objective One

The sampled households in Maputo demonstrated considerable heterogeneity in the consistency of their access to medical care across the variables under investigation (Table 2). For example, half of the sampled households that reported inconsistent access to a cash income in the last year also reported inconsistent access to medical care. Similarly, half the sampled households that were severely food insecure according to the HFIAS also had inconsistent access to medical care in the previous year. Interestingly, at least 85% of the sampled households that maintained consistent access to water, electricity, or a cash income in the last year also maintained consistent access to medical care. Almost 90% of the sampled households that were not severely food insecure also maintained consistent medical care access.

Table 2. Cross-Tabulation of the Consistency of Household Medical Care Access by Household Food Security and Resource Access.

		Medical Care Access		Total	
		Consistent Access	Inconsistent/No Access		
		Row %	Row %	<i>n</i>	Row %
Severe Food Insecurity	Not Severely Food Insecure	87.8%	12.2%	1259	100%
	Severely Food Insecure	55.8%	44.2%	780	100%
Cash Income Access	Consistent Access	88.5%	11.5%	1369	100%
	Inconsistent/No Access	49.5%	50.5%	677	100%
Electricity Access	Consistent Access	89.5%	10.5%	976	100%
	Inconsistent/No Access	62.7%	37.3%	1061	100%
Water Access	Consistent Access	85.2%	14.8%	1350	100%
	Inconsistent/No Access	56.9%	43.1%	692	100%

As would be expected from the previous cross-tabulation, household food insecurity and resource access were associated with a significant change in the odds of inconsistent medical care access among the sampled households (Table 3). As an example, without controlling for any other variables, severe food insecurity was associated with a five-fold increase in the odds of inconsistent household medical care access among the sampled households. Sampled households with inconsistent access to a cash income in the previous year had almost eight times the odds of also having inconsistent medical care access over the previous year. Inconsistent access to water also quadrupled the odds of inconsistent medical care access while inconsistent electricity access led to a five-fold increase in the odds of inconsistent medical care access among the sampled households. Each of these bivariate calculations were made independent of any other variable.

Table 3. Changes in the Odds of Inconsistent Household Medical Care Access by Household Food Insecurity and Inconsistent Resource Access.

Variable	O.R.	C.I. Lower	C.I. Upper	X ²
Severe Food Insecurity	5.691	4.567	7.091	266.799 **
Inconsistent Cash Income Access	7.881	6.297	9.863	374.56 **
Inconsistent Electricity Access	5.103	4.014	6.486	198.748 **
Inconsistent Water Access	4.349	3.516	5.379	197.978 **

** $p < 0.01$, O.R.: Odds Ratio, C.I.: 95% Confidence Interval.

3.2. Research Objective Two

The CHAID decision tree was constructed using only those sampled households with complete data for all variables included in this investigation (Figure 1). The CHAID decision tree built from these variables was 80.55% accurate in categorizing the sampled households according to medical care access. As would be expected from Table 3, cash income access was the best independent variable for categorizing households according to medical care access. Among those households with consistent cash access, the data was then split according to severe food insecurity and then electricity access. Among those

households with inconsistent cash access, the data was then split according to water access and then the severity of food insecurity.

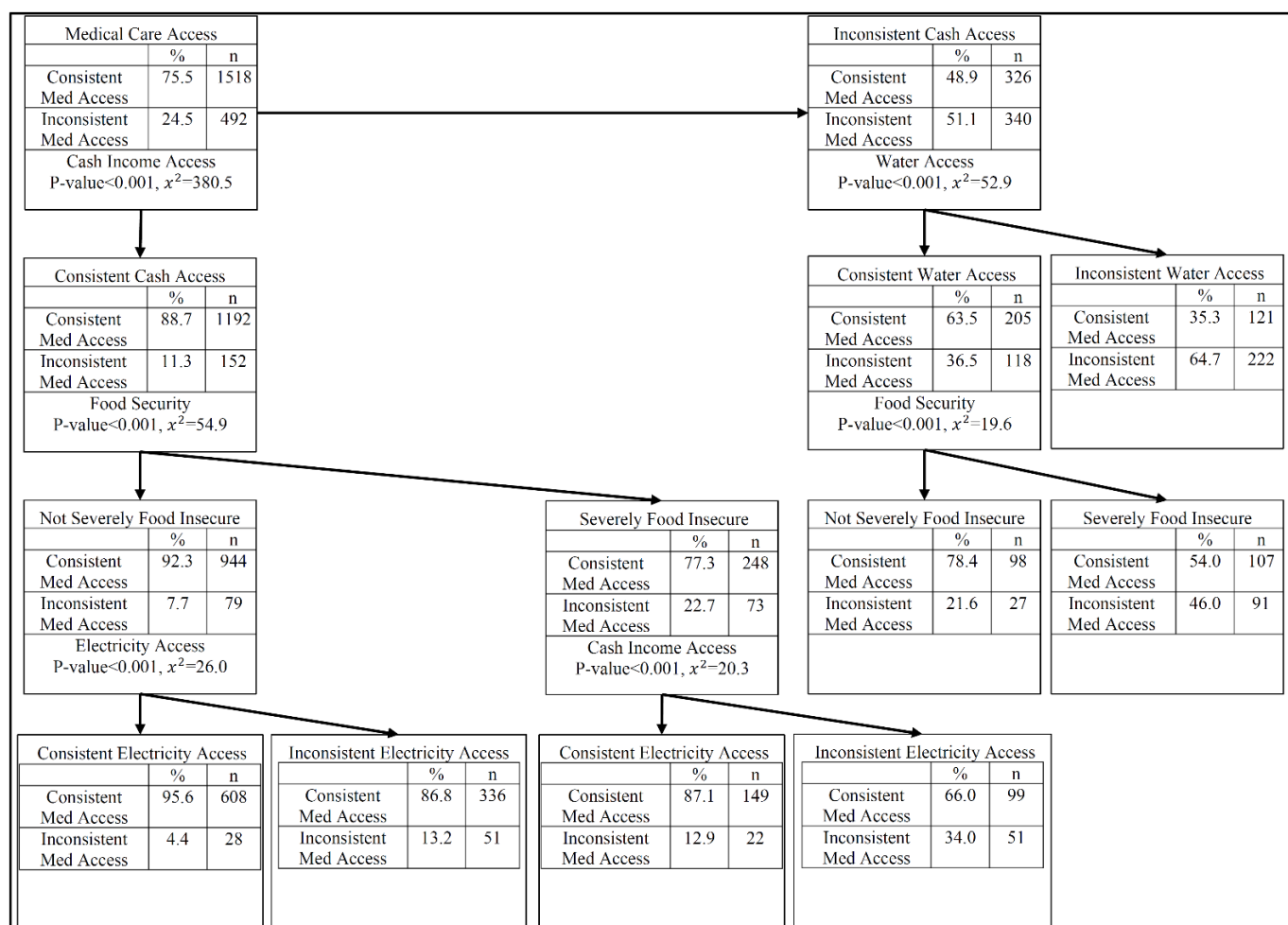


Figure 1. CHAID Decision Tree Categorizing Sampled Households According to Medical Care Access ($n = 2010$).

The CHAID decision tree appears to have been effective in identifying the subsets of the sampled households according to the inconsistency of medical care access in the last year. The CHAID decision tree indicated that almost 65% of the sampled households with inconsistent access to a cash income and inconsistent access to water in the last year had inconsistent medical care access as well. At the same time, almost 96% of the sampled households that were not severely food insecure (and with consistent access to a cash income and electricity in the past year) maintained consistent access to medical care in the past year.

It is important to note that the ward of residence for each household was not included in the final CHAID decision tree, despite the inclusion of this variable as an independent variable in the model building process. This finding indicates that the ward of residence variable was deemed to be a less significant predictor for categorizing the sampled households by the learning algorithm (based on a chi-square analysis) when compared to the other independent variables on the consistency of household resource access and the severity of household food insecurity. That said, if the decision tree were to continue growing beyond the stopping rules, it is possible that the ward of residence would be included in the tree. However, given the sample size used in this investigation, it would be difficult to assess the reliability of these findings for such small subset sample sizes.

4. Discussion

The findings from this investigation indicate that the sampled severely food insecure households, or households with inconsistent access water (SDG 6), electricity (SDG 7), or a cash income (SDG 8), were also more likely to have inconsistent medical care access (SDG 3) in the previous year in the city of Maputo. As an example, almost 65% of the surveyed households with inconsistent access to a cash income and water also reported having inconsistent access to medical care in the previous year. These findings are significant because they suggest that households in Maputo that are the most vulnerable to disease impacts (due to food insecurity and limited resource access) are also likely to have inconsistent access to medical care when inflicted by those infectious diseases. In other words, this investigation reveals a compounded vulnerability carried by such households when working toward the achievement of the SDGs. Furthermore, the findings seem to indicate that these relationships may not be better explained by the spatial distribution of households across the city (as measured by the ward of residence for each household).

Future research will be needed to clarify these research findings according to spatial and temporal dimensions. The limited influence of spatial disaggregation on the research findings is intriguing and may provide a springboard into future investigations into the spatial characteristics of the network effects identified here. Multilevel modelling may provide insight into the spatial impact of urban informality on the relationships identified here. This technique was not applied in this investigation due to concerns around the limited sample size of wards included [41]. Longitudinal research will also help to clarify whether the compounding vulnerability observed in these findings might evolve over time; in other words, whether the relationships highlighted by the CHAID decision tree describe a progression of vulnerability (where households fall into poverty by losing consistent access to an increasing number of resources).

The results of this investigation highlight some of the potential reasons that may underlie the network of relationships linking the SDGs. The network effects of these relationships may be underpinned by a broader compounding vulnerability. For households struggling the most with inconsistent access to medical care, the challenge appears to be buried in a host of other challenges stemming from food insecurity and infrastructure access. On the other hand, the subset of the sampled households with the highest rates of consistent medical care access also appeared to maintain consistent access to infrastructure and maintain food security. The achievement of SDG 3, therefore, appears to be associated with challenges stemming from other SDGs.

These findings give insight into some of the challenges underpinning an effective response to the spread of infectious diseases within the city of Maputo. If many of the households within the city are not able to maintain consistent access to essential resources, or maintain food security, they also will have a limited capacity to ensure healthy living. Furthermore, challenges to household medical care access reflect the urbanization and epidemiological transition challenges faced by municipal authorities. The irony of the situation is that households with the least capacity to access resources related to SDG 6, 7, and 8 also have the most inconsistent access to needed medical care SDG3.

Author Contributions: Conceptualization, C.M. and B.F.; methodology, C.M.; validation, C.M.; formal analysis, C.M.; investigation, C.M., B.F. and N.S.; data curation, C.M.; writing—original draft preparation, C.M., B.F. and N.S.; writing—review and editing, C.M., B.F. and N.S.; visualization, C.M.; supervision, C.M. and B.F.; project administration, C.M. and B.F. All authors have read and agreed to the published version of the manuscript.

Funding: This work was supported by the Social Sciences and Humanities Research Council under Grant No. 895-2013-3005 and the International Development Research Centre under Grant No. 107775-001.

Institutional Review Board Statement: The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by the Institutional Review Board (or Ethics Committee) of Queen's University.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data presented in this study are available on request from the corresponding author.

Acknowledgments: We wish to acknowledge the support of the following: the International Development Research Centre (IDRC) and the Social Sciences and Humanities Research Council of Canada (SSHRC) for the Hungry Cities Partnership.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Parnell, S.; Pieterse, E. (Eds.) *Africa's Urban Revolution*, 1st ed.; Zed Books: New York, NY, USA, 2014.
2. Montgomery, M.R. The urban transformation of the developing world. *Science* **2008**, *319*, 761–764. [[CrossRef](#)] [[PubMed](#)]
3. Montgomery, M.R. The Demography of the Urban Transition: What We Know and Don't Know. In *The New Global Frontier*, 1st ed.; Martine, G., McGranahan, G., Montgomery, M., Fernandez-Castilla, R., Eds.; Routledge: London, UK, 2012; pp. 31–50.
4. United Nations, Department of Economic and Social Affairs, Population Division. *World Urbanization Prospects: The 2018 Revision (ST/ESA/SER.A/420)*; United Nations: New York, NY, USA, 2019.
5. Glaeser, E. *Triumph of the City: How Our Greatest Invention Makes Us Richer, Smarter, Greener, Healthier, and Happier*, Reprint ed.; Penguin: New York, NY, USA, 2012.
6. Parnell, S.; Oldfield, S. *The Routledge Handbook on Cities of the Global South*; Routledge: London, UK, 2014.
7. Neuwirth, R. *Shadow Cities: A Billion Squatters, a New Urban World*; Routledge: London, UK, 2016.
8. Kessides, C. *The Urban Transition in Sub-Saharan Africa: Implications for Economic Growth and Poverty Reduction (Africa Region Working Paper No. 97)*; Cities Alliance: Washington, DC, USA, 2006.
9. Watson, V. Seeing from the south: Refocusing urban planning on the globe's central urban issues. *Urban Stud.* **2016**, *46*, 2259–2275. [[CrossRef](#)]
10. Drimie, S.; Faber, M.; Vearey, J.; Nunez, L. Dietary diversity of formal and informal residents in Johannesburg, South Africa. *BMC Public Health* **2013**, *13*, 1–9. [[CrossRef](#)] [[PubMed](#)]
11. Frayne, B.; Crush, J.; McLachlan, M. Urbanization, Nutrition and Development in Southern African Cities. *Food Secur. Sci. Sociol. Econ. Food Prod. Access Food* **2014**, *6*, 101–112. [[CrossRef](#)]
12. Agyei-Mensah, S.; de-Graft Aikins, A. Epidemiological Transition and the Double Burden of Disease in Accra, Ghana. *J. Urban Health Bull. N.Y. Acad. Med.* **2010**, *87*, 879–897. [[CrossRef](#)] [[PubMed](#)]
13. McCordic, C.; Frayne, B. The Network of Household Barriers to Achieving SDG 1, 2 and 3 in Maputo, Mozambique. *J. Hunger. Environ. Nutr.* **2020**, 1–12. [[CrossRef](#)]
14. Vearey, J.; Luginaah, I.; Shilla, D.J.; Oni, T. Urban health in Africa: A critical global public health priority. *BMC Public Health* **2019**, *19*, 1–4. [[CrossRef](#)]
15. Wilkinson, R.G. The epidemiological transition: From material scarcity to social disadvantage? *Daedalus* **1994**, *123*, 61–77.
16. Drewnowski, A.; Popkin, B.M. The nutrition transition: New trends in the global diet. *Nutr. Rev.* **1997**, *55*, 31–43. [[CrossRef](#)] [[PubMed](#)]
17. Doak, C.M.; Adair, L.S.; Bentley, M.; Monteiro, C.; Popkin, B.M. The dual burden household and the nutrition transition paradox. *Int. J. Obes.* **2005**, *29*, 129–136. [[CrossRef](#)]
18. Harper, K.; Armelagos, G. The changing disease-scape in the third epidemiological transition. *Int. J. Environ. Res. Public Health* **2010**, *7*, 675–697. [[CrossRef](#)] [[PubMed](#)]
19. Wilkinson, R.G. Socioeconomic determinants of health: Health inequalities: Relative or absolute material standards? *Bmj* **1997**, *314*, 591–599. [[CrossRef](#)] [[PubMed](#)]
20. Santosa, A.; Wall, S.; Fottrell, E.; Högberg, U.; Byass, P. The development and experience of epidemiological transition theory over four decades: A systematic review. *Glob. Health Action* **2014**, *7*, 23574–23590. [[CrossRef](#)] [[PubMed](#)]
21. Broyles, S.T.; Denstel, K.D.; Church, T.S.; Chaput, J.P.; Fogelholm, M.; Hu, G.; Kuriyan, R.; Kurpad, A.; Lambert, E.V.; Maher, C.; et al. The epidemiological transition and the global childhood obesity epidemic. *Int. J. Obes. Suppl.* **2015**, *5*, S3–S8. [[CrossRef](#)]
22. Maher, D.; Sekajugo, J.; Harries, A.D.; Grosskurth, H. Research needs for an improved primary care response to chronic non-communicable diseases in Africa. *Trop. Med. Int. Health* **2010**, *15*, 176–181. [[CrossRef](#)] [[PubMed](#)]
23. UN-Habitat. *World Cities Report 2016: Urbanization and Development—Emerging Futures*; UN-Habitat: Nairobi, Kenya, 2016.
24. Nilsson, M.; Griggs, D.; Visbeck, M. Map the interactions between Sustainable Development Goals. *Nature* **2016**, *534*, 320–322. [[CrossRef](#)] [[PubMed](#)]
25. UN General Assembly. *Transforming our world: The 2030 Agenda for Sustainable Development*, 21 October 2015, A/RES/70/1; UNGA: New York, NY, USA, 2015.
26. INE. *IV Recenseamento Geral da População e Habitação: Resultados Preliminares (IV General Census of Population and Housing: Preliminary Results)*; República de Moçambique- Instituto Nacional de Estatística INE: Maputo, Mozambique, 2017.
27. United Nations. *World Urbanization Prospects: The 2011 Revision*; United Nations: New York, NY, USA, 2012.

28. Barros, C.P.; Chivangue, A.; Samagaio, A. Urban dynamics in Maputo, Mozambique. *Cities* **2014**, *36*, 74–82. [\[CrossRef\]](#)
29. Baptista, I. *Everyday Practices of Prepaid Electricity in Maputo, Mozambique (InSIS Working Paper Series July)*; Institute for Science, Innovation, and Society: Oxford, UK, 2013.
30. Ahlers, R.; Perez Güida, V.; Rusca, M.; Schwartz, K. Unleashing entrepreneurs or controlling unruly providers? The formalisation of small-scale water providers in greater Maputo Mozambique. *J. Dev. Stud.* **2013**, *49*, 470–482. [\[CrossRef\]](#)
31. De Carvalho, S.C.P.; Carden, K.J.; Armitage, N.P. Application of a sustainability index for integrated urban water management in Southern African cities: Case study comparison—Maputo and Hermanus. *WaterSA* **2009**, *35*, 144–151. [\[CrossRef\]](#)
32. Raimundo, I.; McCordic, C.; Chikanda, A. *The State of Household Food Security in Maputo, Mozambique (HCP Report No. 10)*; Hungry Cities Partnership: Waterloo, ON, Canada, 2018.
33. INE. *Mortality in Mozambique: Results from a 2007–2008 Post-Census Mortality Survey*; MEASURE Evaluation: Chapel Hill, NC, USA, 2012.
34. Nizamo, H.; Meyrowitsch, D.W.; Zacarias, E.; Konradsen, F. Mortality due to injuries in Maputo City, Mozambique. *Int. J. Inj. Control Saf. Promot.* **2006**, *13*, 1–6. [\[CrossRef\]](#) [\[PubMed\]](#)
35. McPake, B.; Hongoro, C.; Russo, G. Two-tier charging in Maputo Central Hospital: Costs, revenues and effects on equity of access to hospital services. *BMC Health Serv. Res.* **2011**, *11*, 143–151. [\[CrossRef\]](#)
36. Bhojani, U.; Thriveni, B.; Devadasan, R.; Munegowda, C.; Devadasan, N.; Kolsteren, P.; Criel, B. Out-of-pocket healthcare payments on chronic conditions impoverish urban poor in Bangalore, India. *BMC Public Health* **2012**, *12*, 1–14. [\[CrossRef\]](#)
37. Stafford-Smith, M.; Griggs, D.; Gaffney, O.; Ullah, F.; Reyers, B.; Kanie, N.; Stigson, B.; Shrivastava, P.; Leach, M.; O’Connell, D. Integration: The key to implementing the Sustainable Development Goals. *Sustain. Sci.* **2017**, *12*, 911–919. [\[CrossRef\]](#)
38. Coates, J.; Swindale, A.; Bilinsky, P. *Household Food Insecurity Access Scale (HFIAS) for Measurement of Household Food Access: Indicator Guide (Version 3)*; Food and Nutrition Technical Assistance Project: Washington, DC, USA, 2007.
39. Dzumbira, W.; Geyer Jr, H.S.; Geyer, H.S. Measuring the spatial economic impact of the Maputo Development Corridor. *Dev. S. Afr.* **2017**, *34*, 635–651. [\[CrossRef\]](#)
40. Baptista, I. Electricity services always in the making: Informality and the work of infrastructure maintenance and repair in an African city. *Urban Stud.* **2019**, *56*, 510–525. [\[CrossRef\]](#)
41. Maas, C.J.; Hox, J.J. Sufficient sample sizes for multilevel modeling. *Methodol. Eur. J. Res. Methods Behav. Soc. Sci.* **2005**, *1*, 86–92.