



The Violence of Non-Violence: A Systematic Mixed-Studies Review on the Health Effects of Sanctions

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Abstract

The use of sanctions as a policy tool to affect change in the political behavior of target states has increased over the past 30 years, along with a concern about their impact on civilian health. Some researchers have proposed that targeting sanctions can avoid their moral costs, yet others have challenged this claim. This systematic mixed-studies review explored the debate about targeted sanctions by appraising their health effects as reported in the medical and public health literature, with a global focus and through the COVID-19 era.

We searched three electronic databases without temporal or geographical restrictions and identified 50 studies spanning three decades (1992–2021) meeting our inclusion criteria. Using a piloted form, we extracted quotations addressing our research questions and identified themes that we grouped according to the effects of sanctions on health or its determinants, generating frequency distributions to assess the strength of support for each theme. While no study posited a causal relationship between sanctions and health, or engaged the morality of sanctions, most implied that when sanctions were present, health was inevitably impacted, even for sanctions ostensibly targeted to minimize civilian harm. Our findings suggest that given the integrated nature of the global economy, it is all but impossible to design sanctions that will achieve their stated goals without inflicting significant harm on civilians. We conclude that the use of sanctions as a policy tool threatens global health and human rights, especially in times of crises.

Keywords

sanctions, global health, health equity, systematic mixed-studies review, critical health policy

A nation that is boycotted is a nation that is in sight of surrender. Apply this economic, peaceful, silent, deadly remedy and there will be no need for force. It is a terrible remedy. It does not cost a life outside the nation boycotted, but it brings a pressure upon that nation which, in my judgement, no modern nation could resist.

—Woodrow Wilson, 1919, cited in *The Hidden Power of the New Economic Sanctions*, Joy Gordon, 2019

Background

Since World War II, economic sanctions, defined as “the deliberate, government-inspired withdrawal, or threat of withdrawal, of customary trade or financial relations” (¹, p. 3), have been increasingly viewed as the “liberal alternative to war”.² While there is little consensus on whether sanctions can achieve one major goal of sanctioning agents—that is, affect changes in the political behavior of target states—sanctions are generally framed as more humane

than military interventions, because they are presumed to spare civilians from the ravages of armed conflict, thus their increasing use as a foreign policy tool.¹ With the rise of the use of sanctions, there has been a concomitant rise in the concern about their impact on civilian health, especially on the health of vulnerable groups and in times of crises. As the number of peer-reviewed articles, gray literature, and human rights reports addressing the health effects of sanctions has increased in the past decade, these effects have been exposed: They include direct effects such as higher infant mortality and barriers to lifesaving medicine, as well as indirect effects through the impact of sanctions on the social determinants of health—poverty, unemployment,

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and food shortages, or combinations of all of these, and more.^{3–8}

A few salient cases compellingly illustrate the health impact of sanctions: Sanctions imposed over the course of a still ongoing, 70-year-long “forgotten” war have devastated the health of North Koreans, straining the government’s ability to meet the population’s basic human needs, including access to food and to life-saving medical services and supplies.^{9,10} Similarly, more than 60 years of U.S. sanctions on Cuba have brought about extraordinary suffering on the Cuban people.⁷ Sanctions imposed by the United Nations (U.N.) on Iraq in the late twentieth century led to the death of at least half a million children.¹¹ Decades of U.S. sanctions on Iran have destroyed the Iranian currency, throwing many Iranians into poverty and severely impairing access to food, housing, and water.^{12–15} Recent sanctions—or rather, Unilateral Coercive Measures¹⁶—imposed by the United States on Venezuela have frozen assets, banned banks from transactions, and impeded the sale of oil, the country’s main source of income,¹⁷ undermining access to food and life-saving medicines and leading to a conservative estimate of 40,000 avoidable deaths in one year.¹⁸ Sanctions imposed by the United States and Canada on Syria, rather than changing the behavior, or prompting the overthrow of, the Syrian government—the goal of the policy—^{19,20} have led to one of the largest refugee waves in modern history, along with avoidable hunger, disease, and death among civilians unable or unwilling to leave their country.^{21,22}

The question therefore arises whether sanctions can be “targeted” to achieve their goal in ethically permissible ways—that is, without causing undue harm to civilians.²³ While some authors have proposed that sanctions can be made morally acceptable if they are intentionally designed to be more humane—that is, “smart”^{24,25}—others have challenged this claim, noting that despite their seeming bloodlessness and invisibility, sanctions are at least as lethal as, if not more than, armed warfare—indeed, war by other means^{26,27}—sowing comparable death and destruction, as they cut off populations from access to basic human needs via inscrutable bureaucratic apparatuses.^{28,29} One systematic review of sanctions on Iran used a human rights impact assessment tool,³⁰ yet to our knowledge, no systematic review of sanctions has been conducted with no geographical or temporal restrictions, integrating mixed data sources, through the COVID-19 period, and appraising whether this policy tool can be deployed in ethically permissible ways, thus our study.

Methods

Approach

We used a systematic mixed-studies review approach that, in contrast to traditional systematic reviews—best suited to evaluate large amounts of pooled quantitative data via meta-

analyses—allows researchers to combine “the power of stories and the power of numbers” (³¹, p. 30). This combined power enables researchers to address questions concerning complex issues that require synthesizing and critically appraising methodologically diverse, qualitative and quantitative, studies. The approach also encourages researchers to consider a range of ways to assess the quality of, and to synthesize, the data, depending on the goal of a given investigation, so for our purpose, we chose a thematic synthesis approach informed by a critical social science perspective—that is, one that assumes that social power is a fundamental analytic category.^{32,33}

Search Strategy

Our overarching research question was: “What does the medical and public health literature report on the health effects of sanctions?” An ancillary question was: “Given the reported health effects, can sanctions be deployed in ethically permissible ways—that is, without harming civilians?” On July 14, 2020, we conducted a search in the Medline (Ovid), Embase (Ovid), and Web of Science databases using combinations of Medical Subject Headings (MeSH) and search terms, such as “health” and “sanctions,” with no geographical or temporal restrictions (full search strategy available under Supplementary Materials). Because one aim was to appraise the health impact of sanctions in times of crises, in this case under COVID-19, and the first search did not identify any COVID-19-specific article, on June 26, 2021, we conducted a second search to capture articles published 16 months following the onset of the COVID-19 crisis, drawing from the same databases as in the first search, using the same terms, and limiting search dates to July 15, 2020, through June 26, 2021.

Selection Criteria and Screening

To minimize bias in data selection, our search strategy was informed by standard approaches to data selection in systematic reviews.³⁴ We included original studies if they (a) were original research, (b) were peer-reviewed, and (c) reported on the *direct*—on health outcomes and health systems—or *indirect*—on the social determinants of health—impact of sanctions. We excluded those that (a) were not in English; (b) were reviews, case studies, letters to the editor, editorials, commentaries, or perspective articles; or (c) assigned a meaning to “sanctions” that was not the object of our investigation (e.g., “to sanction” as in “to approve”). Because we sought to map and appraise what, but also how, the medical and public health literature reports on the health effects of sanctions, with a view to elaborating on the ethics of the policy, we did not assess articles according to scientific quality or risk of bias, but rather selected those that we deemed relevant to our research goals.³⁵ Drawing from the literature and our research questions, we developed and field-

tested a form that was later used by two investigators to independently screen each study. The first round consisted of title and abstract screening and the second of full-text screening. We resolved discrepancies through full team discussions until we reached consensus.

Data Extraction

We used a piloted Excel worksheet (Microsoft, Redmond, WA, United States) to extract data from included articles, such as author location, funding type, data source, type of study, date and duration of data collection, sample size and participant composition, sanctioning agent, sanctioned country, reported health effects, population subgroups most severely affected, scope of sanctions as reported by authors, and recommendations for handling the health effects of sanctions. We extracted quotations to identify themes concerning reported effects and recommendations to address them and grouped studies according to whether they reported on the direct or indirect impact of sanctions (as defined earlier). We also generated frequency distributions to identify strength of support for identified themes (Table 1).³⁶

Protocol and Registration

Our study followed the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines for conducting reviews in health care.³⁷ The protocol was registered with PROSPERO (registration number: CRD42020193805).

Results

Included Studies

Both searches identified a total of 6,307 articles. After removing duplicates and non-English records, 3,339 articles remained for screening. Upon title and abstract screening, we excluded 3,174 articles, which left 165 for full-text review. We subsequently excluded 115 articles, leaving 50 that met our inclusion criteria. Our inter-rater reliability was 93.3 percent (see Table S1 and Table S2 in Supplementary Materials).

Study Characteristics

As noted earlier, our search had no temporal or geographical restrictions, yet we identified no records prior to the 1990s. Therefore, included records spanned three decades (1992 to 2021), exhibiting a wide range of data collection periods (11 days–30 years), and varying sample sizes (10–6,000 participants), methods (quantitative 68%, qualitative 24%, and mixed 8%), and locations (Iran 46%, Iraq 20%, Yugoslavia 8%, Haiti 4%, Myanmar 2%, Palestine 2%, and Democratic Republic of Congo [DRC] 2%). A minority of records (16%; 8/50) studied several, albeit unspecified, sanctioned countries.

A large minority of articles (40%; 20/50) named one or more sanctioning agents. From within these articles, the most frequently named sanctioning agent was the United States (95%; 19/20), followed by the United Nations (60%; 12/20), the European Union (25%, 5/20), the United Kingdom (10%; 2/20), the Organization of American States (OAS) (5%; 1/20), and Israel (5%; 1/20). Study authors were affiliated with institutions across 10 countries, with Iran exhibiting the highest number of author affiliations (44%; 22/50), followed by the United States (24%; 12/50), where sanctions most frequently originated. A large minority (40%; 20/50) of studies identified international organizations such as the United Nations (12%; 6/50), the World Health Organization (WHO) (6%; 3/50), and the U.S. Agency for International Development (USAID) (6%; 3/50) as involved with mitigating the impact of sanctions on civilians and on the economy.

Over a quarter (26%; 13/50) acknowledged that while medical and humanitarian supplies and services were often exempted from sanctions—that is, sanctions were “targeted”—in practice, supply chains and services were virtually always affected. While only a small minority of articles (12%; 6/50) discussed whether sanctions were effective in achieving a change in the political behavior of target states—the most frequent, manifest goal of the policy—all concluded that sanctions were largely ineffective, or that whatever their effectiveness, it was outweighed by their harmful impact on civilian health.

In addition to the health impact of sanctions, nearly half of the articles (44%; 22/50) studied sanctions in combination with other forms of hostile behaviors, such as warfare. The most frequently cited (77%; 17/22) form of warfare was military interventions, usually by the United States, and about one quarter (23%, 5/22) identified the presence of domestic conflict within the sanctioned country, such as civil war. Three articles (6%; 3/50) discussed the impact of sanctions on health outcomes in the context of COVID-19.^{38–40} None of the articles described the impact of another natural disaster or epidemic on the health of civilians during the sanctions period.

Data collection methods varied, with a large majority (92%; 46/50) employing one single approach, either qualitative (24%; 12/50) or quantitative (68%; 34/50), and a few articles (8%; 4/50) employing mixed approaches (Table 2). More than half of the studies (72%; 36/50) employed surveys, questionnaires, interviews, or national survey data to review participants’ experiences during a sanctions period, such as their ability to access medicines and services and social determinants to their health. More than a quarter of the studies (26%; 13/50) analyzed health outcomes from clinical examinations or patient records. A small number (16%; 8/50) reviewed official documents, such as the list of drugs on the pharmaceutical market.

Direct Impact of Sanctions on Health

All articles (100%) reported on the direct impact of sanctions on health. Our analysis identified 10 themes that we grouped

Table 1. Frequencies of Direct and Indirect Health Effects.

Sub-Category N (%)	Themes (Mechanisms)	Description	No. (%)
Category: Health Effects of Sanctions (Direct) 50 (100)			
Physical Effects 27 (54)	Increased Mortality	<ul style="list-style-type: none"> Increased child, maternal, and general mortality. Infant mortality rates were higher under sanctions than during period of war. Mortality was increased due to malnutrition, infectious disease and chronic illness, and reduced access to medicines. 	16 (59) ¹
	Higher noncommunicable diseases	<ul style="list-style-type: none"> Sanctions led to increased noncommunicable diseases or exacerbation of existing diseases, such as malnutrition, obesity, respiratory diseases, diabetes, cardiovascular disease, oral and vision diseases, multiple sclerosis, epilepsy, and cancer. Children born during the years of economic sanctions were more likely to have chronic illnesses later in life compared to those born before or after this period. Sanctions-induced shortages of food, water, and medicines, and disruptions to health and social service delivery increased both the onset and severity of chronic illnesses. 	17 (63)
	Higher infectious disease	<ul style="list-style-type: none"> Increases in epidemics and infectious diseases, including influenza, malaria, HIV, hepatitis B, gastrointestinal infections, water-borne diseases, typhoid, measles, and polio, and antimicrobial resistance. Communicable diseases that had previously been under control in some countries returned as epidemics during the sanctions period. Worsened by destruction of electric power supply and sewage systems, reduced accessibility of health services, increased unhygienic conditions, and the presence of militaries as a disease vector. 	14 (52)
Mental Health Effects 9 (18)	Higher rates of mental health and addictions problems	<ul style="list-style-type: none"> Depression, stress and anxiety, decreased psychosocial functioning, psychiatric disorders, schizophrenia, and increased smoking and substance use. Stress related to increased economic hardships, lower standards of living. 	7(78)
	Increased need for mental health medications	<ul style="list-style-type: none"> Increased need for mental health medications and treatment modalities. Simultaneous decrease in the availability of medicines and mental health services. Trend toward prescribing the cheapest medicines and prescribing cheap drugs over referrals to other treatment modalities. 	4 (45)
Health System Effects 44 (88)	Barriers to medical services (e.g., fewer health providers)	<ul style="list-style-type: none"> Decreased access to and availability of health care services. Shortages of health care workers, high attrition of nurses and physicians. Degraded health facilities and services. Reduction in health system capacity, such as limited number of inpatient beds. Weakening of health service planning. Curtailed treatment options. Reduced capacity for preventative and curative treatment options. 	22 (50)
	Barriers to medical supplies & equipment (e.g., drugs and vaccines)	<ul style="list-style-type: none"> Trade-related restrictions increased costs and shortages in all drugs and raw pharmaceutical materials, disinfectants and hospital hygiene products, medical equipment, laboratory tests and diagnostic tools, and vaccines. Shortages in medical supplies had direct health impacts on the population, such as increased chronic illnesses and disease mortality, and increased anxiety due to unaffordability of medicines 	34 (77)

(continued)

Table 1. (continued)

Sub-Category N (%)	Themes (Mechanisms)	Description	No. (%)
Category: Health Effects of Sanctions (Indirect) 43 (86) Economic Effects 37 (86)	Decreased funding for public health care	<ul style="list-style-type: none"> Decreased health care spending from sanctions-related deficits and blockades to financial flows, rapid increases in inflation, bankrupting national medical industries, decreases in the availability of the public sector to generate funding for health services, and privatization of health care services. Reduction of spending on medicines, medical infrastructure, health human resources. Increase in out-of-pocket spending for patients. 	24 (55)
	Barriers to medical research	<ul style="list-style-type: none"> Medical researcher and service providers in sanctioned countries were restricted from participating with the international medical research community. Denied funding and economic collaborations, had difficulties obtaining visas to access to international meetings and training courses, were unable to pay for travel and registration expenses, experienced shortages in research and laboratory equipment. Restrictions on publication and research dissemination. 	6 (14)
	Destruction of general economy	<ul style="list-style-type: none"> Froze assets in international countries, restricted commercial flights, prevented the import of necessary goods, impacted financial growth by restricting exports of national products, reduced the state's tax revenues, and targeted banking systems and banned any international financial exchanges. Industrial production fell, national industries were weakened or bankrupted, per capital gross national product and gross domestic product declined substantially, and increased recessions. 	27 (73)
	Collapse of local currency	<ul style="list-style-type: none"> Hyperinflation, national decline in purchasing power, especially for necessary materials. Restrictions on the central banks, such as blocking access to foreign currencies used for trade. Increased national deficits. 	24 (65)
Effects on other Social Determinants 24 (56)	Increased household and individual poverty	<ul style="list-style-type: none"> Increased individual and household poverty. Increased unemployment due to bankruptcy of domestic industries. Gendered economic burdens for women, such as unemployment, increased survival sex-work, disruptions in child rearing and feeding, and breakdown of family structures. Declining incomes in combination with sanctions-inflicted inflation exhausted household resources and limited their choices for survival. 	26 (70)
	Reduced educational opportunities	<ul style="list-style-type: none"> Reduced allocation in education budgets weakened educational outcomes such as reductions in literacy. Falling school enrollment, with many families sending their children to school in turns. 	6 (25)
	Barriers to housing	<ul style="list-style-type: none"> Barriers to construction material, inability to pay rent, no money to fix dwellings, displacement from homes and shelters. 	16 (67)
	Barriers to other public service provision	<ul style="list-style-type: none"> Impaired access to infrastructure maintenance or repair impose barriers on public programs (e.g., provision of water, sewage systems, sources of energy, road maintenance, public transportation). 	3 (13)

(continued)

Table 1. (continued)

Sub-Category N (%)	Themes (Mechanisms)	Description	No. (%)
	Barriers to food supply, production and agriculture	• Barriers to food supply (e.g., imports blockades) and food production due impact on farming industries (e.g., AMR in animals, lack of access to agricultural technologies, destruction of farmable lands, etc.).	15 (63)

Note: Articles with quotes corresponding to more than one mechanism were counted for multiple mechanisms.

¹These percentages represent the proportion of articles that reported on the Sub-Category and discussed the theme. That is, 59 percent of 16/27 of articles that reported on physical effects of sanctions found an increase in mortality.

in three overarching categories: (a) physical health (e.g., higher mortality rates); (b) mental health (e.g., higher rates of mental health and addictions); and (c) health systems (e.g., barriers to medical services and supplies). Articles with quotations that corresponded to more than one health outcome were counted as reporting on multiple outcomes; therefore, frequencies do not add up to the total number of included articles reporting on them. While these outcomes are interconnected in practice (e.g., barriers to health services lead to increased mortality), we separated them for analytic purposes.

Physical Health

A majority (54%; 27/50) of the articles offered evidence for the impact of sanctions on physical health, including increased mortality, higher rates of infectious diseases, and higher rates of noncommunicable diseases.

Increased mortality. Most articles identifying physical effects (59%; 16/27) provided evidence for increased mortality—a large majority from within those articles (88%; 14/16) for *infant mortality*,^{5,41–53} a quarter (25%; 4/16) for *maternal mortality*,^{42,47,48,52,53} and more than a third (36%; 6/16) for *general mortality*.^{48,49,52,54,55} Reasons reported for increased mortality, especially infant and maternal mortality, included mortality from infectious disease,^{5,41,45,51,54} noncommunicable diseases,^{41,48} nutrition-related causes,^{5,41,42,46–48,51} increased poverty,^{42,45,46,49} reduced access to medicines and health care,^{41,42,44–47,49,51} and destruction of public infrastructure.^{41,42,45} Two articles (13%; 2/16) reported that compared to war or natural emergencies, the highest rates of infant mortality occurred under sanctions, concluding that prolonged sanctions are more lethal for infants and children than other sources of social and political distress.^{44,46} Two articles (13%; 2/16) reported that sanctions led to increases in infant mortality rates in regions already impacted by war.^{43,45} Of note, for studies reporting on infant mortality, sanctions increased the risk of death more than any other risk factor.^{5,44} Three articles (19%; 3/16) reported that average life expectancy decreased for both men and women living, or born during, the sanctions period.^{42,48,55} We grouped studies reporting on life expectancy

with those reporting on mortality due to the small number of records listing life expectancy as a dependent variable.

Higher rates of infectious diseases. More than half of the articles that provided evidence for the physical effects of sanctions (52%; 14/27) reported on increases in epidemics and infectious diseases, including influenza,⁵⁶ malaria,⁴³ HIV,⁵⁷ hepatitis B,⁵⁸ gastrointestinal infections,⁴¹ waterborne diseases,^{43,52} typhoid,⁴⁴ measles,^{44,45} polio,⁴⁴ and antimicrobial resistance.⁵⁹ Epidemics were worsened by destruction of electric power supply and sewage systems,^{41,45} reduced access to health services,^{41,44,45,58,59} increased unhygienic conditions,^{43,45} and the presence of war.⁴¹ These articles also reported on the complex interrelationship between protein–energy malnutrition and infectious diseases, noting an increased likelihood of mortality.^{5,41,45} One article (7%; 1/14) reported that communicable diseases previously under control returned as epidemics during the sanctions period.⁴³ Two articles (14%; 2/14) reported that shortages in materials to maintain medical infrastructure, such as propane for vaccine refrigeration, led to fewer immunizations, especially among children, and resulted in viral outbreaks.^{42,45}

Higher rates of noncommunicable diseases. About two thirds of the articles providing evidence for the physical effects of sanctions (63%; 17/27) reported an increase in rates of noncommunicable diseases during sanctions compared with the periods before the sanctions, including increased incidence and worsening of malnutrition (child and maternal),^{5,41–44,47,56,60,61} obesity,¹² respiratory diseases,⁵⁶ diabetes,^{12,56} cardiovascular disease,^{12,56} oral and vision diseases,^{61–63} blood disorders,¹⁵ multiple sclerosis,^{15,64–67} epilepsy,⁶⁸ and cancer.^{12,15} Children born during the years of economic sanctions were more likely to have chronic illnesses later in life compared to those born after this period, likely due to infant and maternal malnutrition.⁶¹ Sanctions-induced shortages of food, water, and medicines and disruptions of health and social services increased both the onset and severity of chronic illnesses.^{43,44,60,61,63,69} Articles reporting on malnutrition found that despite humanitarian aid and medical exemptions, sanctions led to increases in diseases and substantial loss of life.⁵

Table 2. Summary of Selected Characteristics of the 50 Included Studies.

Characteristic	No. (%)
Year of Publication	
1990–1994	1 (2)
1995–1999	3 (6)
2000–2004	6 (12)
2005–2009	4 (8)
2010–2014	6 (12)
2015–2019	15 (30)
2020–2021	15 (30)
Sanctions Present During Study	
Yes	42 (84)
No	3 (6)
Not applicable	5 (10)
Independent Variable	
Sanctions	30 (60)
Sanctions & other warfare	12 (24)
Sanctions & local government policies	2 (4)
Sanctions & COVID-19	3 (6)
Poor quality of health system and health research	3 (6)
Dependent Variable	
Child mortality or morbidity	11 (22)
Access to medicines and equipment	11 (22)
Health systems and services	12 (24)
General health	3 (6)
Oral or vision health	3 (6)
Mental health	3 (6)
Malnutrition or food insecurity	3 (6)
Adult mortality	2 (4)
Other (e.g., antimicrobial resistance & social welfare)	2 (4)
Reported Other Types of Conflict	
International wars	14 (28)
Domestic conflict (e.g., civil wars, domestic militias)	5 (10)
Coups	1 (2)
Foreign intervention	1 (2)
Siege	1 (2)
N/A	28 (56)
Reported Organizations Involved in Mitigation	
United Nations	6 (12)
WHO	3 (6)
USAID	3 (6)
Domestic NGOs	3 (6)
Foreign donors (allies and major powers)	3 (6)
Other international NGOs	2 (4)
N/A	30 (60)
Research Approaches	
Single	46 (92)
Mixed	4 (8)
COVID-19 Studied	
Yes	3 (6)
No	47 (94)

Mental Health

A small minority of articles (18%; 9/50) reported greater incidence or exacerbation of mental health issues, including

higher rates of mental health and addictions and an increased need for mental health treatment.

Higher rates of mental health and addictions. All articles reported increases on at least one or a combination of mental health issues, such as depression,⁵⁶ stress and anxiety,^{61,67,70,71} decreased psychosocial functioning,⁷¹ psychiatric disorders,^{46,61,71} schizophrenia,⁶⁹ and smoking and substance use.⁶¹ One study (11%; 1/9) reported that increased maternal stress and anxiety during the sanctions period contributed to an increase of pre-term delivery and vision impairments among newborns.⁶¹ Mental health and addictions were driven by stress related to increased economic hardships,^{61,67,70,71} lower standards of living,^{60,61,67,71} and limited choices for survival or migration.⁴⁶

Increased need for mental health treatment. Half of the articles reporting on mental health effects of sanctions (45%; 4/9) found an increased need for pharmacological and non-pharmacological treatments^{65,67} and a simultaneous decrease in the availability of both.⁷¹ Overall, articles in this category reported that mental health issues were exacerbated by impaired access to treatment,^{68,71} high prices of drugs,⁶⁸ and limited or no access to psychiatric nurses, community psychiatric services, or psychologists.⁶⁹ They also reported an increase in outpatient and inpatient use of medications such as benzodiazepines during the sanctions period,⁷¹ a trend toward prescribing the most inexpensive drugs even if other treatment modalities were more suitable,^{68,71} reduced visits to psychiatrists or diagnostic services,^{67,68,71} and increased hospitalizations.⁷¹

Health Systems

Most articles that provided evidence for direct health effects of sanctions (88%; 44/50) provided evidence for their effects on health systems, including barriers to medical services, medical supplies, and equipment, decreased funding for public health care, and barriers to medical research.

Barriers to medical services. Half of the articles (50%; 22/44) indicated decreased access to primary care services,⁵⁶ reductions in the health care labor force,^{13,40,59,69,72,73} difficulties obtaining medical care for children,⁵⁶ deteriorated health facilities and services,^{13,15,46,49,51,64,65,71,74,75} reduction in health system capacity—for example, limited number of inpatient beds,^{55,69,73} weakening of health service planning,^{13,40,73} curtailed treatment options,^{55,71} and reduced capacity for preventative and curative treatment options.⁵⁵

Reasons for decreased availability of medical services included an exit of nursing and medical staff,^{69,72,73} restricted contact between local doctors and international experts,⁶⁹ lack of gasoline and electricity,⁶⁹ weakened infrastructure,^{41,44,56,69,72,73} and decline in revenues leading to cuts in health care services.^{13,47,55,59,72} Increased difficulties with

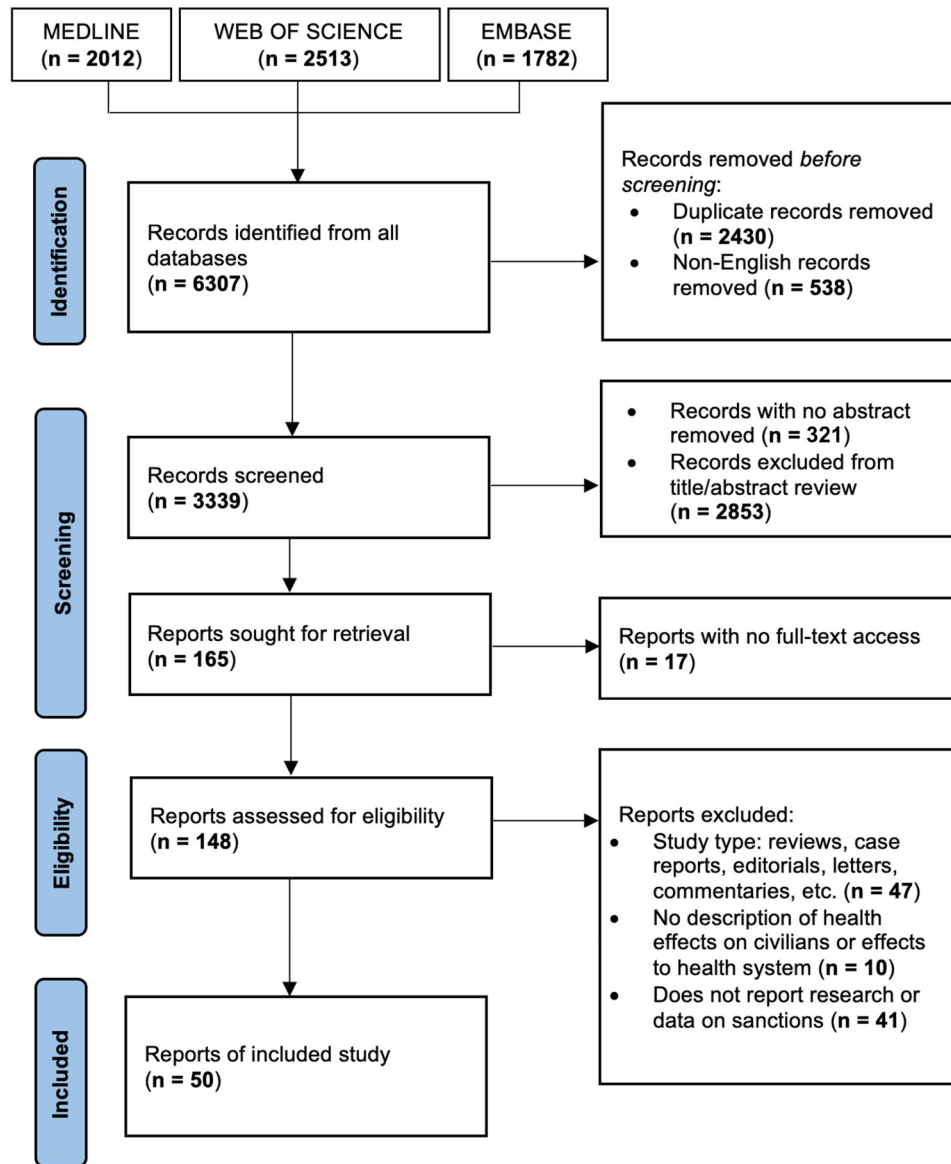


Figure 1. PRISMA flow chart for study selection.

health care delivery resulted in decreased use of diagnostic and therapeutic services,^{56,71} reduced health care training programs,^{73,76} low staff-to-patient ratios,^{65,69,76} demoralizing working conditions for health care staff,^{55,73,76} weakened quality of care,^{13,72,73,76} increased wait times,^{45,77} backlogs and increased delays in admissions,⁵⁶ attention only to emergency cases,^{54–56,65} and failure to provide non-urgent treatments or surgeries altogether.^{54,56} Articles reported that concomitant with the decrease in medical services, the need for hospital treatment had increased under sanctions.^{56,72} A few articles in this category (18%; 4/22) noted that in some instances, sanctions preceded or were followed by wars and military invasion, which in the latter case destroyed infrastructure and health facilities already weakened by sanctions.^{56,69,72,73}

Barriers to medical supplies and equipment. Three quarters of the articles providing evidence for the effects of sanctions on health systems (77%; 34/44) described barriers to obtaining medical supplies as the leading health system impact of sanctions. Barriers included trade-related restrictions increasing prices and shortages of supplies, such as drugs and raw pharmaceutical materials,^{12–14,38,40,42,44,46,54,55,59,61,64–69,72,73,75,76,78–80} disinfectants and hospital hygiene products,^{40,56} medical equipment,^{13,38,54,56,61,69,70,72,73,76} laboratory tests and diagnostic tools,^{56,59,70,73,74} and vaccines in human and animal sectors.^{42,54,58,76,81} One author argued that barriers to medical supplies and equipment impaired the functioning of sovereign health systems,⁷³ reflected in a large minority of articles (38%; 13/34), which discussed the collapse of

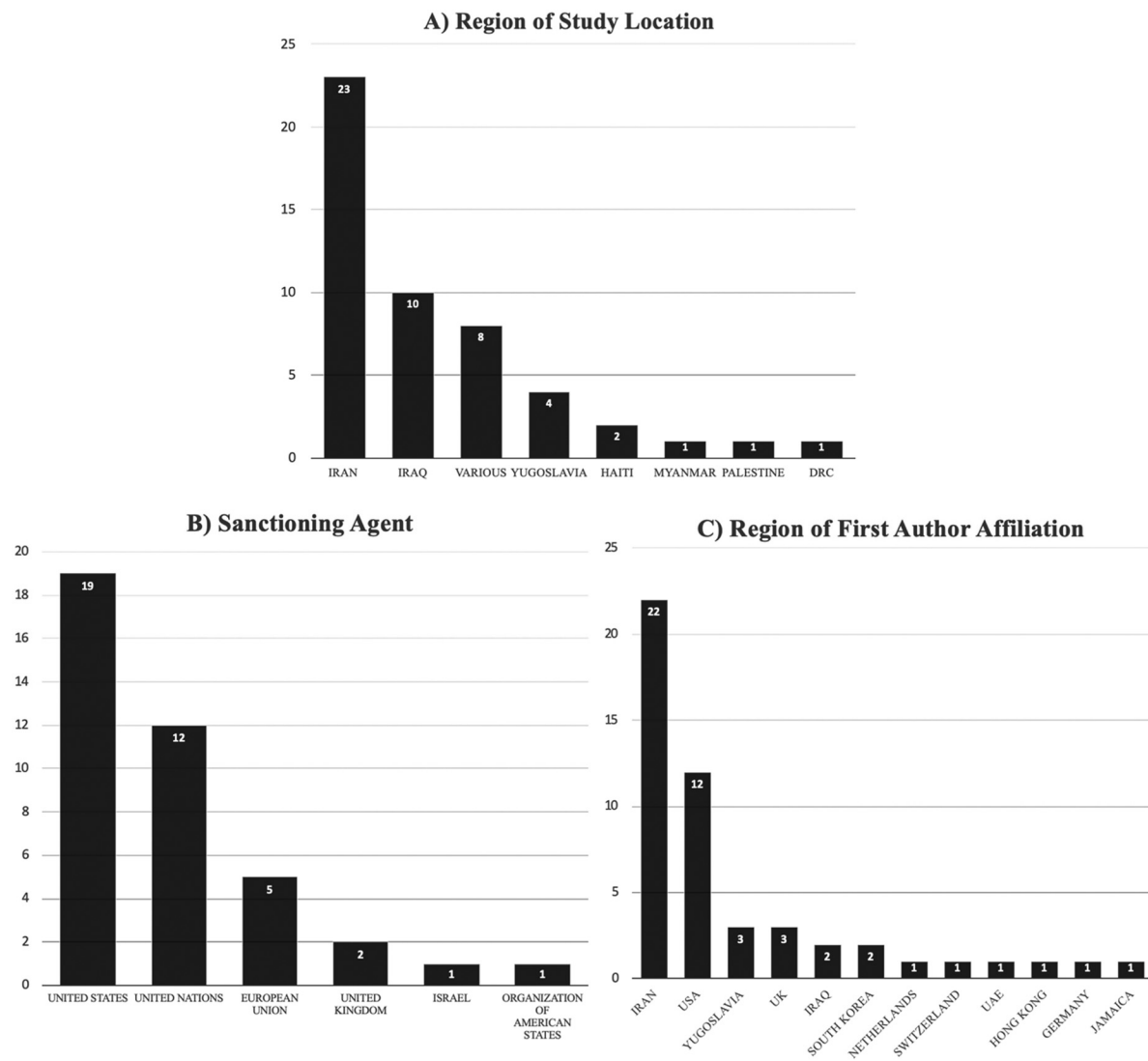


Figure 2. Bar charts showing region-level data pertaining to the studies included in the analysis. Bar chart (A) depicts the number of studies taking place in each of the sanctioned countries of study. Bar chart (B) depicts the number of articles that named each sanctioning agent. Bar chart (C) quantifies the country with which the first author is affiliated.

local drug production,^{14,69,76} breakdowns of national vaccine programs,^{42,58} reductions in the immunization rates and resurgences of previously contained epidemics,^{42,45,46} inability to treat ordinary and treatable diseases,^{55,58} and inability to sustain hospital units or maintain existing medical equipment.^{13,38,54,70,72,73} Shortages in medical supplies had direct health impacts on population health, such as increased chronic illnesses and mortality^{15,42,44,46,58,66,68,75} and increased anxiety due to unaffordable medicines.^{64,65}

About a fifth of articles (18%; 6/34) acknowledged that despite medical and humanitarian exemptions, imports of medical supplies and raw goods were restricted under sanctions,^{42,55,68,69,79,80} with pharmaceutical companies choosing not to ship products to sanctioned countries.^{42,68,80} A few

articles (15%; 5/34) reported that to overcome shortages of supplies, health facilities had to purchase them in the black market at dramatically higher prices,^{50,54,56,68,70} use less expensive and less effective substitutes,^{70,71} or require patients to bring their own materials—such as needles, sheets, and food—to receive hospital treatment.⁵⁶

Decreased funding for public health care. Most articles reporting on health system effects of sanctions (55%; 24/44) stated how reduced funding leads to less spending on health care, including medicines and medical equipment,^{15,46,54,56,59,64,65,67–71,81} medical services and treatment,^{13,47,54,64,65,69,73,75,82} medical infrastructure,^{43,47,73} and human resources.^{47,69} A large minority (42%; 10/24) reported that as health care funding decreased, the financial burden on

patients increased, along their inability to pay out-of-pocket for needed medical care.^{13,15,56,64,65,67,68,75,78,82} Some articles also noted that in sanctioned countries, patients were often required to pay in advance for surgeries and bring to the hospital necessary medical items for treatment.^{56,75}

About a third of the articles (38%; 9/24) reported that many patients were denied care or were unable to adhere to medications due to cost-related barriers^{13,56,64,65,68,70,75,78,81} Reasons reported for decreased health care spending included sanctions-related deficits and blockades to financial flows,^{54,59,60,70,71,75,82} rapid increases in inflation,^{13,54,59,70,75} bankruptcy of medical industries,^{13,67,75} decreases in the availability of the public sector to generate funding for health services,^{13,54,59,60,70,73,75,82,83} and privatization of health care services.^{56,73} The decrease in funding led to lower quality of care and health system capacity,^{13,59,60,68,71,75,76,82} deterioration of medical facilities and equipment,^{13,43,46,59,70,73} a weakened health policy sector,^{13,59,75,76} and shortages in medicines and health services.^{15,59,64,65,68,73,75,78,81} To overcome these challenges, health facilities were required to ration health services^{54-56,73} and replace appropriate treatments with less expensive, less effective, and even potentially dangerous strategies, such as purchasing medicines in the black market.^{67,69,71,78} Impacts on the health system and on patients' ability to access health services exacerbated risk of disease and death.^{15,43,46,59,64,68,69,71,75}

Barriers to medical research. A small number of articles from within those that reported on their impact on health systems also reported on the impact of sanctions on medical research (14%; 6/44).^{48,59,68,70,73} For instance, medical professionals in sanctioned countries were restricted from participating with the international medical research community,^{13,59,68,70} were denied funding and economic collaborations, had difficulties obtaining visas to access international meetings and training courses, were unable to pay for travel and registration expenses, experienced shortages in research and laboratory equipment, experienced barriers to publishing in international journals, and lost contact with international partners.^{13,59,70} Restricted participation in the international research community compromised the quality of medical treatment and the production of medicines and equipment.^{13,68,70} Sanctioned countries also experienced significant brain-drain, as researchers left their countries during the sanctions period.^{48,70,73}

Indirect Impact of Sanctions on Health

Most articles (86%; 43/50) also reported on the indirect health impact of sanctions. Within these articles, we identified seven themes that we grouped in two overarching categories: (a) economic impact (e.g., increased household and individual poverty) and (b) impact on other social determinants of health (e.g., barriers to food supply). Articles with

quotations corresponding to more than one theme were counted as reporting on multiple themes; therefore, frequencies do not add up to the total number of included articles reporting on them. While themes were interconnected in practice (e.g., precarious employment leads to decreased access to food and housing), we separated them for analytic purposes.

Economic Effects

A large majority of articles providing evidence for the indirect effects of sanctions (86%; 37/43) reported on economic impact, including destruction of general economy and national industries; collapse of local currency; increased household and individual poverty; reduced educational opportunities; and barriers to food supply, housing, and public services.

Destruction of general economy and national industries. A majority of articles providing evidence for economic effects (73%; 27/37) described the destruction of the general economy, such as freezing of international assets,^{13,14,42,47} restricted commercial flights,⁴² blocked import of necessary goods,^{13-15,42,44,47,50,54,59,60,66,68,70,73,80} impacted financial growth by restricting exports of national products,^{13,14,42,44,47,54,60,66,70,72,73,75} reduction in tax revenues,⁴⁷ targeted banking systems,^{14,59,66,80,82} and banned international financial exchanges.^{13,47,59,68,70,80,82} A disturbing finding was articles reporting that under U.S. sanctions, even non-U.S. companies refused to sell supplies to sanctioned countries to avoid U.S. penalties.^{59,66,68,70,82} We also found that during sanctions periods, industrial production fell,^{40,54} national industries were weakened or bankrupted,^{13,40,46,48,60,75,82} per capita gross national product and gross domestic product declined substantially,^{13,42,44,46,47,52,75,83} and recessions developed.⁷⁵ These economic disruptions severely weakened health and social systems,^{13,47,54,60} impacted social security spending,^{13,60} reduced resources for health care services,^{13,47,54,60,66,75,82} prevented governments from responding to public health emergencies,⁴⁷ led to shortages of medicines and other medical supplies,^{47,50,54,70,73,83} and resulted in extensive rationing of food and medicines.⁴⁴

Collapse of local currency. Nearly two thirds of the articles (65%; 24/37) that described the health effects of sanctions through their economic effects reported on the collapse of the local currency. Articles reported that sanctioned countries experienced currency crises such as hyperinflation^{12-15,40,44,47,50,52,59,66,71,72,75,83}; a national decline in purchasing power, especially for essentials such as medicine, gasoline, food, and construction material^{13,42,44,59,78}; restrictions on the central banks^{13,59,77,80,82}; blocked access to foreign currencies used for trade^{14,50,59,66,82}; and increased national deficits.⁸² About a third (29%; 7/24) identified the role of

sanctions in rising prices of essential materials, noting that during the sanctions period, there was a rise in the average price of nutritious and traditional foods, medicines and medical supplies, and gasoline.^{12-14,54,75,78} Inflated prices resulting from sanctions were exacerbated by shortages in transport and gasoline⁴²; embargoes on raw materials required for food production and health services^{47,59}; scarcity of supplies, most notably medicines^{14,42,44,47,59,80}; and decreases in wages.^{14,44,71} A majority (63%; 15/24) reported that hyperinflation led to rising prices in food and medicines that impacted the chance of survival,^{14,54,75,83} to unemployment and poverty,^{13,14,47,52,60,75} to unaffordable health services,^{14,47,66,75} to food insecurity,^{12,41,42} to exacerbation of disease,⁷⁸ and to higher mortality.^{46,47,78}

Increased household and individual poverty. A large majority of the articles (70%; 26/37) that reported on the economic effects of sanctions described that during the sanctions period, there were decreases in income levels,^{44,47,48,50,52,54,65,71,75} increases in individual and household poverty,^{41,47,48,50,52,54,65,76} and increases in unemployment due to bankruptcy of domestic industries.^{13,39,40,42,47,48,59,60,67} A small minority (12%; 3/26) reported that women in particular experienced increasing economic burdens,^{42,49,60} such as unemployment,^{42,49,60} sex work to survive,⁶⁰ disruptions in child rearing and feeding,⁴² and breakdown of family structures.⁴² Declining incomes, in combination with sanctions-inflicted inflation, exhausted household resources and limited choices for survival^{44,48,50,53,66,67}; reduced migration opportunities even as the imperative to migrate was itself exacerbated by sanctions⁴⁶; and increased expenditures on food,^{14,42,49,65,66,71} housing,^{48,53} electricity,⁴⁸ and children's education.^{42,48} Households that were unable to pay for health care experienced barriers to accessing medical services^{14,49,56,64,66,71} and medications.^{14,44,49,56,71,75,78} Sanctions-led poverty was also related to increases in child mortality,^{41,44,46,50} epidemics,³⁸ mental illness,⁴⁶ and chronic diseases.^{46,60,78}

Effects on Other Social Determinants of Health

More than half of the articles (56%; 24/43) that provided evidence for the indirect effects of sanctions identified effects on other social determinants of health.

Reduced educational opportunities. A quarter of articles (25%; 6/24) reported on reduced educational opportunities for civilians of sanctioned countries, and about half of these (50%; 3/6) reported that prior to sanctions, education systems were well-established, and during the sanctions period, reduced allocation in education budgets had affected educational outcomes, such as literacy,^{45,48,65} rates of passing for baccalaureate examinations,⁴² and school enrollment.⁴² Reduced educational outcomes impacted future economic and social prospects, for instance, leading to increased household

poverty,⁵⁰ decreased infant weight, and increased infant mortality.^{45,50}

Barriers to food supply. Two thirds of the articles (67%; 16/24) identified barriers to food supplies leading to food insecurity. A majority of these articles (63%; 10/16) reported a reduction in the quality, availability, and affordability of food during the sanctions period driven by trade embargoes on food products,^{12,38,40,42,47,55,59} inflation of food prices,^{42,44,47,59} limitations to the banking and financial system,^{12,59} and sanctions-related impacts on agricultural development.^{42,44,50,55,59} Sanctions also were found to impact domestic food production by restricting imports of seeds, fertilizers, and animal feed^{55,59}; reducing funding to develop agricultural infrastructure and technologies^{48,59}; and decreasing the availability of water for farming. Barriers in food imports and destruction of agricultural systems led to disruptions in food sovereignty and inability to enforce food safety standards.⁵⁹ Households replaced traditional staple foods with less expensive and less nutritious alternatives,^{12,42,59} and lower incomes led to fewer meals.^{12,38,42,59} The time spent working, or in search of labor, reduced time for meal preparation, for breast-feeding, and for childcare activities.⁴² To relieve food shortages, governments were forced to impose rations, offer subsidies, maintain food aid programs, and accept low-grade and unsanitary foods from illegal vendors.^{12,42,44,48,55,59,62} Due to rising food prices, government efforts to mitigate food insecurity had minimal, if any, impact on increasing access to food.¹² Half of the articles (50%; 8/16) reported that reduced access to food resulted in poor health outcomes, including malnutrition, generally among infants and children^{12,38,48,50,55,63}; oral diseases,^{12,62,63} and mortality.^{12,47}

Barriers to housing. A small number of articles (13%; 3/24) reported on barriers to housing. Authors noted that sanctions, combined with other forms of hostile behaviors from sanctioning agents such as warfare, had led to poor housing conditions for the majority of the populations living under sanctions,^{48,73} that sanctions-induced inflation reduced the affordability of housing,¹² and that sanctions on trade restricted access to building and maintenance materials. Two articles reported that a large proportion of the population lived in squatter settlements as a result of displacement.^{48,73}

Barriers to public services. Most articles in this category (63%; 15/24) reported on the impact of sanctions on public programs and infrastructure. Authors noted that sanctions disrupted the supply of electric power,^{41,44,47,48,73} sewage and water sanitation systems,^{41,42,44,47,48,62} access to fuel,^{48,56,73} and transportation systems and infrastructure.^{42,48} A few articles (20%; 3/15) reported that propane and gasoline,⁴² transportation supplies,^{42,48} and building materials^{48,73} were critical to providing medical services and that sanctions on

these materials led to the collapse of national “cold chains” for vaccine refrigeration,⁴² halted the transportation of essential medical supplies,^{42,48} impaired access to drinking water,^{42,43,45,55,69,72} prevented the maintenance of medical equipment,^{48,73} caused road traffic injury,⁴⁸ and produced power outages in the health care sector.⁷³ Articles also noted that these materials were rarely exempt from sanctions.

Other Considerations

Close to a third of the articles (28%; 14/50) studied sanctioned countries that were under military invasion either concurrently with, or following, the sanctions period. Some of these articles reported on the impacts of both sanctions and warfare on civilian health and found that adult mortality rates were higher during periods of war, yet child mortality rates were higher under sanctions.^{5,44} Nearly half of the articles (40%; 20/50) reported on humanitarian assistance provided by nonprofit organizations and other nations to mitigate the health, economic, and social impacts of sanctions,^{13,42,55,73,76} while close to one third (30%; 15/50) stated that even when sanctions were designed with humanitarian exemptions, they still affected civilian health and safety. A few (8%; 4/50) acknowledged that this assistance could not offset the economic effects of sanctions or reported that sanctions blocked humanitarian assistance altogether,^{13,55,59,76} whereas one article argued that humanitarian assistance was not always helpful, as it often led to the privatization of health services and weakened the ability of states to support publicly financed health care.⁷³ Having established, if not causality, at least the coexistence of sanctions with a severely impacted health system and worse health outcomes, a small minority of articles (12%; 6/50) concluded by recommending smart sanctions (as defined earlier). No article called for—considering their documented effects on civilians—lifting sanctions altogether.

COVID-19

Three articles (6%; 3/50) described the impact of sanctions throughout the COVID-19 period. All of these articles described difficulties that sanctions placed on health systems to respond to COVID-19.^{38–40} Food insecurity and poor health outcomes induced by sanctions increased individual vulnerability to COVID-related morbidity and mortality.³⁸ One article found that sanctions on medical supplies led to the need to domestically produce drugs to treat COVID-19.³⁹

Discussion

Our findings indicate that sanctions dramatically affect health, directly or indirectly, via their impact on the social determinants of health. Authors did not assert that the relationship was causal, yet they explicitly attempted to identify, explain, and quantify changes in health during the sanctions

period, often as compared to the periods prior to, or after, sanctions, and reported that even so-called targeted or smart sanctions disproportionately affect the most vulnerable. Articles that identified sanctioning agents cited most frequently the United States, the United Nations, and the European Union.

Our findings contrast with the Global Sanctions Database (GSDB), which identified sanctions as most frequently originating from the United States, Canada, and the United Nations. Given that at the time of this writing, Canada is sanctioning 21 countries (Belarus, Central African Republic, DRC, Iran, Iraq, Lebanon, Libya, Mali, Myanmar, Nicaragua, North Korea, People’s Republic of China, Russia, Somalia, South Sudan, Sudan, Syria, Ukraine, Venezuela, Yemen, and Zimbabwe),⁸⁴ none of which is threatening Canada’s national security, its absence from the list of top sanctioning agents identified in our review is disconcerting: It may indicate, for instance, a publication bias in the literature driven by the “amicable” image of Canada on the world stage, albeit with important implications for global health equity because of the negative effects of the use of this policy tool on the health and well-being of civilians globally. While our data do not allow us to draw conclusions on this point, it deserves further examination.

Similarly, the articles collectively identified seven sanctioned countries, despite the GSDB identifying more than 113 countries sanctioned during the same time period.^{85,86} The finding of this absence is critical, as it indicates a serious blind spot in the expert literature, reflecting the relatively weak attention paid by health researchers to a policy tool of major global health impact. As mentioned earlier, Canada is sanctioning 21 countries, yet our search did not yield any articles studying sanctions in most of them, including Belarus, Central African Republic, Lebanon, Libya, Mali, Nicaragua, North Korea, People’s Republic of China, Russia, Somalia, South Sudan, Sudan, Syria, Ukraine, Venezuela, Yemen, and Zimbabwe. However, our findings suggest that the health impact of sanctions in these countries is pervasive, and therefore the absence of a critical appraisal of this impact in the peer-reviewed literature is concerning.

Another concerning finding is that a few articles reported that under U.S. sanctions, even non-U.S. companies refused to sell supplies to sanctioned countries to avoid U.S. penalties.^{59,66,68,70,82} This is confirmed in the gray literature reporting on *secondary* sanctions, meaning sanctions—often deployed by the United States—against entities that engage in business with sanctioned countries.⁸⁷ While authors did not elaborate on the health implications of these occurrences, in light of the significant power that the United States exerts on the global economy, we posit that attempts by other international actors to make up for the shortage of basic needs—food, medicines, energy, and construction materials, among others—brought about by

sanctions will fail. The destruction of national industries, such as pharmaceutical industries, occurring under sanctions virtually always undermines efforts by national governments to offset via domestic production, at least in the short term, the shortages caused by sanctions regimes.⁸⁸

Another blind spot in the expert literature is the dearth of discussion about how the policy of sanctions measures against key tenets of international law. While elaborating on the legal implications of the policy is beyond the scope of our work—and granted, the work of the authors we reviewed—scholars committed to global health equity, as many of our included articles suggest the authors were, should be aware of, and alert the population about, the extent to which sanctions may violate these tenets, often inevitably so. Legal considerations with moral repercussions include the prohibition to inflict collective punishment enshrined in the Geneva Conventions,⁸⁹ as well as the right to health established in the U.N. Declaration of Human Rights⁹⁰ and reaffirmed in the WHO Health in All Policies initiative,⁹¹ all three spear-headed, we note, by the top sanctioning agents in modern history: the United States, Canada, and the European Union.⁸⁵

Although we conducted a second search to capture the impact of sanctions on the ability of governments to respond to COVID-19, at the time of this search, the literature still had very few peer-reviewed studies reporting original research on the topic. These articles reported that sanctions posed significant difficulties for health systems to respond to COVID-19.^{20,92–95} We observe, however, that major pre-COVID-19 sanctions regimes remain in place.^{26,96,97}

Limitations

Many articles studied several countries—one of them more than 95—yet only seven countries (Iran, Iraq, Haiti, Yugoslavia, Palestine, Myanmar, and the DRC) were identified by name. Therefore, one important limitation of our analysis is that it is not generalizable to the currently 113 sanctioned countries, nor is it able to determine the full range of countries for which the health effects of sanctions are being studied. Such, for instance, is the case of Yemen, where according to mainstream—albeit not peer-reviewed academic—venues, the joint effect of sanctions and armed conflict have led to one of the largest humanitarian disasters in modern history.^{98–100} Further, as noted earlier concerning Canada, a major sanctioning agent, our data do not allow us to elaborate on why the health impact of its sanctions policy is absent from the empirical medical and public health literature. We also excluded non-peer-reviewed and non-English articles, even if these may have shed further light on the issue, given that much work on the topic of sanctions has been conducted by volunteer organizations,¹⁰¹ and all but one country currently under sanctions is in the global South (whereas sanctioning agents, where English is the academic language of choice and often the official language, are

overwhelmingly in the global North).¹⁰² It follows that our findings likely *underestimate* the health effects of sanctions, omitting as much as they reveal about the impact of the policy.

Yet another potential limitation is that the literature we assessed studied the health effects of sanctions almost entirely in countries that are far weaker politically than the sanctioning agents. However, as the use of this foreign policy tool becomes more widespread and targets increasingly more powerful states—such as China and Russia—and as the latter support, and seek alliances with, state actors in the global South—sanctions may ultimately backfire, by hitting hardest the populations of sanctioning agents: citizens of North America and the European Union. We did not find any evidence for this contention, but an increasing number of reports in influential Western outlets—for example, *The New York Times*, *The Globe and Mail*, and *The Guardian*—indicate that this may be the case.^{103–106} Further research could examine whether and how the balance of power between sanctioning agents and sanctioned countries affects the distribution of the health effects of sanctions on civilians, and may strengthen, rather than undermine, our conclusion that it is ordinary people who suffer the most under this policy.

Finally, we cannot determine causality between sanctions and health due to our choice of methods and the complexity of our object of inquiry. However, we find no alternative explanation for our findings about health harms than the presence of sanctions. We also believe that given the magnitude of this harm, and the evidence that, at least sometimes, inflicting harm has been the *explicit* purpose of sanctions regimes,^{107–109} the burden of proof to demonstrate that sanctions are ethically deployed lies on sanctioning agents.

Conclusions

Given the complex and integrated nature of the global economy, and the dramatic inequality of power between sanctioning agents and sanctioned countries, our findings provide very strong evidence that sanctions cannot be tailored to narrowly achieve their manifest goals. We conclude that the policy of sanctions should not be deployed because it predictably undermines global health and inevitably impairs the enjoyment of a right to health. Moreover, as systematic reviews of the literature incorporate qualitative methodologies and critical perspectives, as we have attempted to do, further research could explore how sanctions policy is discursively treated by leading social institutions—not only medicine but also government and the not-for-profit sector—to critically appraise the implications of expert discourses for global health equity.


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Supplemental Material

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