Descriptive Analysis of the 2014 race-based healthcare disparities measurement literature

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Abstract

Importance—There are more than 500 articles in the 2014 race-based healthcare disparities literature across a broad array of diseases and outcomes. However, unlike many other forms of research (e.g., clinical trials, systematic reviews) there are no required reporting guidelines when submitting results of disparities studies to journals.

Objective—Describe the race-based healthcare disparities measurement literature in terms of study design, journal characteristics, generation of health disparities research, type of disparity measure used, and adherence to disparities measurement guidelines.

Methods—We searched three databases of peer-reviewed literature, PubMed, Ovid Medline, and JSTOR, for English language articles published in 2014 on racial/ethnic healthcare disparities. Studies must have quantitatively measured the difference in health outcomes between two racial/ethnic groups in order to be included. Our final sample included 266 studies from 167 medical and public health journals.

Findings—Only 7% (n=19) of articles reported both an absolute and relative measure of disparity; the majority of studies (64%, n=171) reported only a relative measure of effect. Most studies were published in clinical journals (74%, n=198), used secondary data (86%, n=229), and calculated black-white disparities (82%, n=218). The most common condition studied was cancer (25%, n=67), followed by a surgical procedure (18%, n= 48). On average, articles in the sample only met 61% of the applicable guidelines on reporting of disparities.

Conclusions and relevance—To be able to synthesize findings in the racial disparities literature (meta-analysis), there is a need for the use of consistent methods for quantifying

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disparities and reporting in the literature. A more consistent battery of measures and consistent reporting across studies may help speed our understanding of the origins and development of solutions to address healthcare disparities. Despite guidelines for best practices in reporting disparities, there is a lack of adherence in the current literature.

Keywords

racial health disparities; systematic review; literature review; descriptive analysis; methods; measures

Introduction

Since the nineteenth-century, there have been efforts to better understand the black-white gap in health status[1–4]. While these efforts have expanded to include other racial and ethnic minorities, the majority of extant research has focused on black-white disparities. The 1985 Secretary's Task Force (Heckler) Report on Black and Minority Health [4] began to characterize and document “excess deaths” by showing differences in black and white health status which ignited a national conversation about the differences in health between African Americans, Native Americans, Hispanics, and Asians/Pacific Islanders compared with whites. The Heckler Report estimated sixty thousand excess deaths on average each year from 1979-1981 in minority populations that likely would not have occurred if these persons were white. Several research studies, offices of minority health, and programs emerged to address these excess deaths following the Heckler Report.

Haynes and Smedley (1999) began to define and articulate a focus on health care and cancer disparities with the goal to increase the effectiveness of the National Institutes of Health's research programs and affect translation and dissemination of research results to improve cancer survivorship [5]. One year later came *Healthy People 2000* that had a primary focus to examine and reduce racial/ethnic differences in health. Two years after the release of *Healthy People 2000*, the Institute of Medicine released *Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care* [3]. Evidence garnered from this report displayed the contribution of differences in socioeconomic conditions to racial and ethnic disparities in health care. The report also provided recommendations to 1) increase awareness of disparities among general public, key stakeholders and healthcare providers; 2) legal, regulatory, and policy interventions (e.g., diversify healthcare workforce, increase resources for civil rights law enforcement, limit differences in public and private health insurance, decrease health plan fragmentation, improve patient-provider relationships) 3) health systems interventions (use of evidence-based guidelines, restructure payment systems, enhance patient-provider communication and trust, use language services where needed, use community health workers and multidisciplinary treatment teams); 4) patient education and empowerment; 5) cross-cultural education in the health professions; 6) data collection and monitoring and 7) research needs (contributing factors, barriers, and promising interventions)[3].

Since these seminal reports on health disparities, Adler and Rehkopf (2008) discovered in their search of the peer-reviewed literature that the term health disparities was used as a

keyword once in the 1980s, thirty times in the 1990s, and in four hundred articles from 2000 to 2004 [6]. Over the last twenty years, the terminology has also shifted from not only talking about the differences in health status between racial, ethnic, gender and different social classes to a larger focus on health inequalities and the social determinants of health. As researchers continue to document differences in health status and identify the larger historical, political, social, and economic determinants, one possible framework has been articulated by Kilbourne and colleagues (2006) to classify the study of health disparities in health care systems [7]. This three-part conceptual model includes (i) Detection Phase where disparities are defined, vulnerable populations are identified, measures are developed, and potential confounders are considered in analyses; (ii) Understand Phase where the determinants of disparities are identified at the patient/individual level, the provider level, experiences in the clinical setting and within the broader health care system; and (iii) Reduction Phase, where solutions and interventions are developed, these interventions are evaluated for their effectiveness, results are translated and disseminated, and policies are changed [7]. Thomas and colleagues (2011) modified this conceptual model to include a fourth phase using a social justice framework and focused on achieving health equity through community-based approaches [8].

Despite growth in the extant literature, an increase in funding, and a revised mission to address the underlying causes of health disparities; black-white differences in mortality continue to increase and research has yet to fully articulate an evidence based approach to disparities reduction [9]. To determine progress made in reducing disparities, it is necessary to examine and begin synthesizing the range, depth, and breadth of the health disparities literature to determine the best approaches and areas for future work. However, given the methodological issues in measuring health disparities and the impact of study design, measurement, and analysis on study conclusions a necessary first step is to conduct a systematic review of health disparities methods (study design and measurement) [10–14] and categorize hypotheses examined within the generations of health disparities research conceptual model initially articulated by Kilbourne and colleagues [7] that was modified for a public health audience by Thomas and others [8]. There are several key measurement issues for health disparities research: 1) identifying datasets with appropriate variables for disparities analyses; 2) determining what differences count as a disparity and how they will be measured; and 3) choosing a statistical method to examine racial disparities [14].

We conducted a systematic review and descriptive analysis of the race based healthcare disparities quantitative measurement literature to examine study characteristics and place hypotheses examined in a conceptual context. Our interest in studying healthcare disparities was driven by several measurement questions: 1) where are studies focusing on racial healthcare disparities being published, 2) what types of hypotheses are being examined 3) what methods (study designs and measures) are being used to assess racial healthcare disparities, and 4) are studies adhering to recommended analysis guidelines. These questions helped to guide our inclusion and exclusion criteria as well as guide our analysis of the studies identified.

Methods

We examined English language articles indexed in three databases of peer reviewed literature, PubMed, JSTOR, and OVID Medline, which represent journals with reliable peer review processes and broad representation of the health and health care literature. We conducted a systematic review of literature from January 1, 2014, to December 31, 2014, using the search terms racial AND (healthcare or “health care”) AND disparit*. We initially found 458 results in PubMed and added 381 articles from Ovid Medline and 72 from JSTOR, for a total of 530 records to be examined for inclusion after we removed duplicates (Figure 1). We summarized the literature quantitatively by four broad study characteristic areas: (i) generation of health disparities research [7,8], (ii) types of disparities measures used [15], (iii) journal characteristics and study design, and (iv) adherence to recommended disparity analysis guidelines [13]. Studies that discussed but did not quantitatively measure the difference in health outcomes between two different racial/ethnic groups were excluded from our study (n = 56; see Fig. 1). We created several variables by extracting appropriate information from each study. Each article was independently reviewed by a master's level statistical data analyst to extract the necessary information. Our final analytic sample contained 266 articles, comprising 264 search results from PubMed and 2 from JSTOR (Figure 1).

We created a data set that contained the full citation, journal, impact factor of journal, and several variables we created based on information extracted from each of the articles. Journal category was dichotomized as public health or clinical. Impact factor provides a measure of the level of dissemination and accessibility of the research findings. Articles were summarized with information on the research question or hypothesis being tested, study population, sampling procedure, racial groups compared, reference group, outcomes examined, factors controlled for in the analysis, disparity measures used in analysis, time period, and study conclusion.

From this information we created several study characteristic variables that were used for analysis. Indicator variables were created to classify studies based on the populations included, populations compared, level of analysis, study design, health condition, disparity measure, and generation of health disparities based on Kilbourne and colleagues [7]. Specifically, each article was classified into one of the three generations of health disparities research (1) detect - do disparities exist? (2) understand - what causes of disparities? (3) provide solutions - do interventions work? [7,8]. Information on the disparities measure(s) used in the study were classified into four categories (absolute, relative, both, or use of significance test only) based on the type of measure(s) used to determine if racial disparities exist[15]. We also created indicators for several health conditions: cancer, chronic disease, mental health, and infectious disease.

We determined whether or not each article met the 11 guidelines (where applicable) for measuring health disparities set by the Centers for Disease Control and Prevention (CDC). For each applicable guideline [13], the article was either given a value of one, for meeting the guideline, or zero, for failing to meet the guideline. There was 1 guideline that was not applicable to race-based healthcare disparities measurement literature because it only applied to situations with ordered groups (when the primary interest is how health varies

with the amount of the characteristic defining the domain, summary measures that take into account the ordering of the groups should be considered), and since race is not ordered this guideline was excluded from our analysis. Two of the guidelines related to summary measures (summary measures can be used when comparisons are made across time or across indicators, the choice of whether to weight the component groups when summarizing disparity across a domain should take into consideration the purpose and application of the summary measures). None of the articles in the sample included summary measures likely due to the inclusion criteria that the article must calculate a disparity between two racial/ethnic groups, therefore these guidelines are not applicable to any articles in the sample and were excluded from the study. The remaining 8 guidelines were applicable to at least one article in our sample. However, other guidelines were conditional on having a certain type of disparity measure (relative or absolute), so if a paper did not include the specified type of measure, the guideline was considered not applicable. We calculated the proportion of applicable guidelines met by each article. Given these criteria, eight was the maximum number of guidelines that could be applicable to a paper.

We quantitatively describe the 2014 race-based healthcare disparities measurement literature in terms of journal type, racial groups compared, racial/ethnic groups included in study, study characteristics, generation of health disparities research, type of disparity measured used, and impact factor of publication journals. Dichotomous and categorical variables created to examine study and journal characteristics are described univariately using frequencies and percentages. Impact factor of the journals in which articles published and all sample size variables are summarized by the median and range. All analysis was conducted using SAS 9.4 (SAS Institute Inc., Cary, NC).

Results

Table 1 shows study characteristics for the 266 studies. Most studies (n=198; 74%) were published in clinical journals; 26% (n=68) were published in public health journals. These journals had a broad range of impact (0.3-54.4) with a median impact factor of 2.9; 30 % (n = 79) of articles were published in journals with an impact factor ≥ 4 .

The majority of studies utilized secondary data (n=229; 86%), had an observational study design (n=261; 98%), and calculated black-white disparities (n=218; 82%). More than half of the studies included Hispanics as a separate racial/ethnic group (n=152; 57%) in analysis. The median percentage of White subjects in the sample was 64% (range: 0 – 95%), and the median percentage of Black subjects was 16% (range: 0 – 83%). The median percentage of Hispanic individuals was 8% (range: 0 – 81%). The majority (n=246; 93%) of studies reported statistically significant differences between races and these disparities persisted in adjusted analyses (n=199; 75%). Only a few studies (n=8; 3%) did not conduct a significance test or control for additional factors (n=45; 17%) when examining racial differences.

While 17% (n=45) of studies conducted multilevel analysis, 32% (n=84) included some neighborhood-level or hospital-level factors. The study outcome on which the disparity was based was determined by diagnosis in 61% (n=161) articles; the remaining studies used either self-reported outcomes or a mix of diagnosis and self-reported outcomes (n=104,

39%). The samples sizes of the studies ranged greatly from 38 individuals to 92,788,909, with a median of 9,259 subjects. The median percentage of females was slightly higher than males (53% versus 50%), but 52 studies included only women, and 10 included only men.

Cancer was the most prevalent health condition examined in the 2014 race-based healthcare disparities measurement literature (25%). The articles in the sample examined a wide variety of cancers including breast, bladder, cervical, prostate, colorectal, endometrial, head and neck, liver, lung, multiple myeloma, ovarian, and thyroid. Additionally, 18% of the literature was related to surgical procedures (e.g., waiting time to aneurism procedure, cesarian delivery). Chronic disease and mental health were other frequent topics (17% and 14% of the studies, respectively).

The majority (n=176; 66%) of articles were classified as first generation of health disparities research (detection), examining whether disparities exist. An additional 30% (n=79) were second generation of health disparities research in the understand phase trying to identify the causes of a disparity, and the remaining 4% (n=11) were third generation articles examining potential solutions to eliminate disparities through intervention research.

We examined each article to determine whether the guidelines for reporting disparities measures were met (Table 2) [13]. On average, articles met 61% of the applicable guidelines. Most articles explicitly identified a reference point (n=206; 94%), included pairwise comparisons (n=232; 87%), and interpreted conclusions based on summary measures along with group-specific rates (n=247; 93%). A majority (n = 201; 76 %) of studies use Whites as the reference group. Additionally, 85% (n=185) of the articles provided confidence intervals around each measure of disparity, and 74% (n=161) used the more favorable rate as a reference point when making a comparison between two groups. However, only 7% (n=19) of the articles measured disparities in both absolute and relative terms, 25% (n=66) of the articles took the size of the groups into account when assessing the impact of the disparity, and among those that used a relative measure less than half (46%; n=88) expressed the outcome in terms of adverse events.

Discussion

Successful elimination of disparities will require a shift from defining problems to the development and testing of potential solutions that is supported by funding sources and health policy action [7,8]. There are several methodological issues to consider when measuring health disparities and the choice of a summary measure used to quantify racial disparities makes a substantive difference in the results and interpretation of data [13,16]. It is recommended that a suite of measures including both absolute and relative measures be used when examining disparities but this guideline was only met in 19 (7%) studies in the sample. The majority (71%; n=190) of studies reported a relative disparities measure as this is the most appropriate measure type for comparing racial/ethnic disparities between populations with different age distributions.

Our descriptive analysis of published reports shows that a majority (86%) of the disparities quantitative measurement literature is based on secondary data analysis; those conducting secondary data analysis often draw on limited measures of key variables (e.g., race/ethnicity,

SES) as these data may not have been assembled or collected in the original studies with an aim of addressing disparities.

This study extends the work of King et al.[17] which examined reporting on health inequalities of articles published in 2009 in 10 leading journals. Our sample was drawn from 167 different journals using 3 different electronic databases, leading to a much more generalizable estimate of the 2014 health disparities measurement literature. However, we chose to focus our study on only racial and ethnic disparities. Finally, we examined additional best practice guidelines [13], generation of health disparities research, study design and journal characteristics in addition to the types of disparities measures used as done in previous work. Future work should move this work beyond measurement to the examination and synthesis of results including the size of disparities between races, causes identified and potential solutions. In addition as the language around health disparities evolves keywords are likely to change and future reviews should expand key word searches to include health equity and the social determinants of health. This can be furthered by using these key words for specific populations, disease outcomes, and health behaviors.

Study limitations

The study findings should be interpreted in light of several key study limitations. Our extraction of articles likely missed studies that reported differences by race but did not use disparities as a key word. Another limitation is the bias for studies with statistically significant, positive results to appear in journals, as historically studies with significant findings are approximately three times more likely to be published than similar studies with null or negative findings [18–20]. Investigators are also less likely to submit null results for publication. While the emergence of open access journals has the potential to reduce such biases in the literature, we found that the majority of the studies were not published in open access journals (92%) and reported significant results (93%). While the lack of evidence for disparity might be highly informative, or if statistically underpowered, addressed through systematic review and meta-analysis, peer-reviewers and editors may be less likely to accept/publish findings that are not statistically significant [18,21].

Our analysis is limited to 1 year of peer-reviewed research literature; future work should examine multiple years as types and rates of publications may be influenced by funding trends. In addition, to get a clear picture of disparities, expansion to work outside of the research literature including national reports (e.g., annual progress reports of Healthy People, National Healthcare Disparities Report, annual vaccination coverage articles) is necessary. We believe the articles included in our sample are generalizable to the 2014 (the most recent year available at the time of study) peer-reviewed, English language race-based healthcare disparities quantitative measurement literature accessible to researchers, clinicians, and policy makers. Despite its limitations, this study is an important comprehensive methodological examination of the race-based healthcare disparities literature that utilizes quantitative measurement.

Conclusion

To be able to quantitatively synthesize the racial disparities literature using meta-analysis, there is a need for the use of consistent methods for measuring disparities and examining changes over time. This will allow for a way to not only assess trends in disparities but to also understand the magnitude of change over time in regards to racial-differences in health outcomes that may result from more intervention studies. A more consistent battery of measures may also help speed our understanding of the origins and solutions for disparities. Our review suggests a need to shift health disparities research into the solutions phase by identifying effective interventions that reduce/eliminate racial healthcare disparities. Study design and measurement are key components in this shift to examine absolute and relative impact of various interventions.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1.
Search results and sample development

Table 1

Characteristics of 266 studies on health disparities

Variable	N (%)
Journal category *	
Clinical	198 (74.4%)
Public health	68 (25.6%)
Generation	
1 - Detection	176 (66.2%)
2 - Understanding	79 (29.7%)
3 - Possible solutions	11 (4.1%)
Data source	
Secondary data	229 (86.1%)
Registry/datab ase	119 (44.7%)
National survey	82 (30.8%)
Other	65 (24.4%)
Study Design	
Multi-level modeling	45 (17.0%)
Neighborhood factors	84 (31.6%)
Observational study	261 (98.1%)
Intervention occurred	5 (1.9%)
Disparity measure	
Absolute only	29 (10.9%)
Relative only	171 (64.3%)
Both relative and absolute	19 (7.1%)
Significance test only	47 (17.7%)
Black-White comparison	218 (82.0%)
Hispanic included	152 (57.1%)
Outcome determination	
Diagnosis	161 (60.8%)
Self-report	94 (35.5%)
Diagnosis or self-report	10 (3.8%)
Condition studied	
Cancer	67 (25.2%)
Surgical procedure	48 (18.1%)
Chronic disease	45 (16.9%)
Mental Health	38 (14.3%)
Infectious disease	26 (9.8%)
Racial Disparities	
Statistically significant difference	246 (92.5%)
No significance test	8 (3.0%)
Disparities persist in adjusted analysis	199 (74.8%)
No multivariable analysis	45 (16.9%)

Variable	N (%)
Impact Factor	
>4	179 (67.3 %)
4	79 (29.7 %)
Not available	8 (3.0%)

* Median impact factor is 2.9 (range: 0.3 – 54.4)

Table 2

Number and percentage of articles applicable to and meeting each guideline

Guideline	Applicable articles (%) ^a	Adherent articles (%) ^b
Explicit reference point identified	219 (82.3%)	206 (94.1%)
More favorable group rate used as reference point	219 (82.3%)	161 (73.5%)
Both absolute and relative measure of disparity	266 (100 %)	19 (7.1 %)
Indicators expressed in terms of adverse events when relative measures used	190 (71.4%)	88 (46.3%)
Pair-wise comparisons included to describe disparities between individual groups	266 (100%)	232 (87.2%)
Conclusions interpreted in conjunction with group-specific rates	266 (100%)	247 (92.9%)
Size of groups and number of persons affected in each group taken in to account	266 (100%)	66 (24.8%)
Confidence intervals should accompany each measure of disparity	219 (82.3%)	185 (84.5%)

^a Number and percentage of articles in the overall sample to which the guideline was applicable

^b Number and percentage of guideline-applicable articles that met the guideline criteria