

# What Do the Various Principles of Justice Mean Within the Concept of Benefit Sharing?

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**Abstract** The concept of benefit sharing pertains to the act of giving something in return to the participants, communities, and the country that have participated in global health research or bioprospecting activities. One of the key concerns of benefit sharing is the ethical justifications or reasons to support the practice of the concept in global health research and bioprospecting. This article evaluates one of such ethical justifications and its meaning to benefit sharing, namely justice. We conducted a systematic review to map the various principles of justice that are linked to benefit sharing and analysed their meaning to the concept of benefit sharing. Five principles of justice (commutative, distributive, global, procedural, and compensatory) have been shown to be relevant in the nuances of benefit sharing in both global health research and bioprospecting. The review findings indicate that each of these principles of justice provides a different perspective for a different benefit sharing rationale. For example, commutative justice provides a benefit sharing rationale that is focused on fair exchange of benefits between research sponsors and communities. Distributive justice produces a benefit sharing rationale that is focused on improving the health

needs of the vulnerable research communities. We have suggested that a good benefit sharing framework particularly in global health research would be more beneficial if it combines all the principles of justice in its formulation. Nonetheless, there is a need for empirical studies to examine the various principles of justice and their nuances in benefit sharing among stakeholders in global health research.

**Keywords** Benefit sharing · Justice · Post-trial obligations · Resource-limited countries · Research ethics

## Background

Benefit sharing raises concerns of justice because global health research and bioprospecting activities in resource-limited countries are sometimes characterized by unjust treatment of participants and communities in those regions (Schuklenk and Kleinsmidt 2006). Global health research here refers to health research involving human subjects that is sponsored by research organizations in developed countries but conducted in resource-limited countries. This global health research could be clinical trials organized by commercial research sponsors in developed countries but outsourced in resource-limited countries. Petryna (2007) outlined some reasons why clinical trials may be conducted in resource-limited countries: low cost of trial related-expenditures, ease of participants' recruitment, and less stringent regulatory oversights. Moreover, some of the clinical trials are conducted without fair benefits to the host communities

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(Petryna 2007). Bioprospecting activities refer to the systematic exploration and research of new sources of chemical compounds, genes, micro-organisms, macro-organisms, and other valuable products from nature. Also, the term is used to refer to the research on indigenous knowledge related to the utilization and management of biological resources (Castree 2003).

In the past, there were cases where researchers obtained medicinal plants from resource-limited settings and developed them into profitable commercial products without arranging any benefit to the local settings where the plants were obtained (Schuklenk and Kleinsmidt 2006). Taking undue advantage of research participants and communities in global health research and bioprospecting is exploitation and needs to be minimized (Benatar 2000).

One of the ways to minimize exploitation in research is through benefit sharing (Gbadegesin and Wendler 2006). Benefit sharing pertains to the distribution of benefits but also, often implicitly, to the burdens arising from research and development activities. It concerns what is owed to those people who participate in research but also to those who might not have taken part personally but live in the same community or wider population where research is undertaken (Simm 2007a). Historically, benefit sharing has evolved from a concept enshrined in an international legal framework, the Common Heritage of Humankind, to a non-binding ethical regulation in international research guidelines (Dauda and Dierickx 2013). According to the principle of the Common Heritage of Humankind, benefit sharing regulation is set to ensure that all states, irrespective of their international influence, equally share the benefits derived from the resources of the common heritage sites (the moon and other celestial bodies as well as the sea and subsoil beneath) (Holmila 2005). Similarly, benefit sharing within the regulation of the Convention on Biological Diversity (CBD) is enshrined as a law, making it an obligatory practice among countries that ratified the CBD regulation (CBD 1992). The CBD regulation deals with the issue of research involving non-human genetic resources (such as plants, microorganisms and animals resources) and traditional knowledge obtained from bioprospecting activities. However, benefit sharing for global health research involving human subjects and their genetic resources is not subject to binding regulations but only indicated in

non-binding international ethics guidelines for research conduct.

Justice is a complex concept that deals with fairness in benefits and burdens that persons deserve as a result of their particular circumstance and interaction with others in human interaction (Beauchamp and Childress 2009). There are many aspects of human interaction whereby justice is prescribed (such as criminal justice, social justice, political justice, occupational justice, organizational justice, etc.). Each of these aspects of justice is ascribed to deal with a type of human interaction within society. For example, criminal justice deals with the human interaction that pertains to upholding laws, protecting citizens, prosecuting criminals who break the law, and institutionalizing guilty criminals (Bernard and Engel 2001). Occupational justice deals with a different aspect of human interaction, focusing on promoting fairness, equity, and empowerment to enable opportunities for participation in occupations (Durocher, Rappolt, and Gibson 2013). This paper focuses on the principles of justice that are relevant to the distribution of benefits or burdens as a result of people's interactions in global health research or bioprospecting.

First of all, justice is linked to benefit sharing because it seeks to address fairness for the participants and communities in the distribution of benefits, advantages, profits, and burdens in interaction with research sponsors such as the pharmaceutical companies and contract research organizations (CROs) (Pratt and Loff 2011). However, this link is not immediately clear, since there are various principles of justice according to which a certain situation of benefit sharing can be assessed as “just,” each time in a different way. For example, the principle of distributive justice focuses on the fairness in the *distribution* of benefits and burdens with consideration of the *inequality* among different persons or groups in the interaction. In other words, equals should be treated equally and unequals should be treated unequally in any given interaction. This is in contrast to commutative justice, which focuses on the fairness in distribution based on contractual agreements with no consideration on the inequality of the different persons or groups in the interaction.

This article examines the various ways in which justice is being understood when it comes to benefit sharing in global health research and bioprospecting activities. We explore the meaning of these principles of justice in benefit sharing, identify the reasons why these principles of justice are being applied to the

concept of benefit sharing, and discuss the relevance as well as the drawbacks of each principle when applied to benefit sharing. This article starts with selection and appraising of publications that meet the inclusion criteria for the review, followed by presentation of results, and ends with discussion and conclusion of the various principles of justice as applied to benefit sharing.

## Methods

The method used is a systematic review of reasons (Strech and Sofaer 2011), and it consists of the following procedure: (1) formulation of the research question and inclusion criteria, (2) identification of publications that meet the inclusion criteria, and (3) extraction and synthesis of data.

### Review Question and Inclusion Criteria

The central research question to the systematic review of reason is:

*What are the various principles of justice and arguments used as reasons for benefit sharing in global health research and bioprospecting?*

The inclusion criteria in a systematic review of reasons should be able to identify all the publications that include the reasons mentioned in the central research questions. It is also important to justify the inclusion criteria (Strech and Sofaer 2011). Accordingly, we established the following inclusion criteria for publications in the review:

- i. We included peer reviewed articles, published academic literature, comments, book excerpts, and reports that discuss the principles of justice that are conceptually related to the concept of benefit sharing. The inclusion of the different types of papers is to ensure a wide coverage of possible literature on the topic
- ii. We only considered publications that discuss justice and benefit sharing within the context of global health research or bioprospecting activities, because that is the focus of our research.
- iii. We considered publications that were published between January 1980 and January 2015. The

choice of 1980 is based on the fact that the discourse on benefit sharing emerged in the 1980s within the Common Heritage laws such as the United Nations Convention on Law of the Sea (UNCLOS). The discourses on benefit sharing became more pronounced after the Rio Convention on Biological Diversity in 1992 (Dauda and Dierickx 2013). As such, the choice of 1980 provides a good time span that captures the needed publications for the review.

- iv. We only considered publications that were published in English. This is because of the difficulty of translating other publications.

### Identification of All the Literature that Meets the Inclusion Criteria

Strech and Sofaer (2011) recommend that a database-specific search strategy should be used in identifying the literature for a systematic review of reason. For example, the use of MeSH terms in PUBMED should be employed to determine if the search keywords in the review are contained in the MeSH terms of PUBMED. In view of this recommendation, we conducted the search for publications using four electronic bibliographic databases: PUBMED, EMBASE, WEB OF SCIENCE (WOS) and GOOGLE SCHOLAR. The selection of these databases was motivated by their regular use in biomedical research. We used a database-specific search strategy in order to obtain an optimum output of the publications from each database.

For the PUBMED database, we first use the MeSH term search strategy. The keywords “justice,” “benefit sharing,” “global health research,” “international clinical research,” and “bioprospecting” were searched on the MeSH database. We noted that the keywords “justice” and “bioprospecting” were contained on the MeSH vocabulary. However, other keyword such as “benefit sharing” and “global health research” and “international clinical research” were no MeSH terms. Consequently, we did not include MeSH terms in our search. We built up our search strings using four different combinations of search strings in order to obtain wide range of publications outcome. These were “justice AND benefit sharing,” “justice AND international clinical research,” “justice AND bioprospecting,” and “justice OR social justice AND benefit sharing OR post study benefit AND global health research OR

international clinical research AND bioprospecting OR convention on biological diversity.” We also use the same search strings for the other databases aside from Web of Science, where we used “benefit sharing AND international research AND convention on biological diversity.” For the Google Scholar database, we considered the search output of the first two hundred publications for each search strings. We considered this number to be exhaustive for retrieving relevant articles for the review. More so, the Google scholar setting was adjusted to order publications according to their relevance to the search topic (Table 1).

It is important to note that at this stage of searching, not all publications obtained from the search result met all the inclusion criteria (Strech and Sofaer 2011). To ensure that only the publications relevant to the research question were included in the review, we applied a method for selecting the publications that did meet the inclusion criteria. Firstly, we read the titles of the publications and excluded publications that did not in any way suggest any idea of the research question. For example, the publication “Comparative metabolic physiology in the ‘omics’ era: a call to arms, paws, flippers, and claws” does not suggest any idea in relation to the research question and has, therefore, been removed from the publications. Secondly, we read the abstracts and full

texts to select the publications that presented any principle of justice that serves as a reason for benefit sharing in the context of global health research and bioprospecting. Thirdly, after finalizing which publications were to be included for the review, a few more publications were added through use of the “snowball method.” The snowball method involves locating or tracking relevant articles within the bibliography of the selected publications. The process of selecting the publications was independently conducted by two of the authors—Dauda and Dierickx—with the included articles agreed to by both.

### Extraction and Synthesis of Data

Beginning at the level of abstract and proceeding to the level of full text, we read the content of the publications and grouped them according to the principle of justice given as a reason for benefit sharing. The publications assessment as to whether they present an analysis of principles of justice and benefit sharing was done independently among the authors. At the end, the authors discussed and agreed on the publications that were included in the review. Publications were categorized into a particular principle of justice if they mentioned the principle of justice and analyse it with the concept of

**Table 1** Search strings used in the databases

Database	Search strings
PubMed	“justice AND benefit sharing” “justice AND international clinical research” “justice AND bioprospecting” “justice OR social justice AND benefit sharing OR post study benefit AND global health research OR “international clinical research AND bioprospecting OR convention on biological diversity”
Embase	‘justice/exp OR justice AND benefit AND sharing AND [1980-2015]/py “justice AND international AND clinical AND research” “justice AND bioprospecting” “justice OR social AND justice AND benefit AND sharing OR post AND study AND benefit AND global AND health AND research OR international AND clinical AND research AND bioprospecting OR convention AND on AND biological AND diversity”
Web of Science	“justice AND benefit sharing” “justice AND international clinical research” “justice AND bioprospecting” “benefit sharing AND international research AND convention on biological diversity”
Google Scholar	“justice AND benefit sharing” “justice AND international clinical research” “justice AND bioprospecting” “justice OR social justice AND benefit sharing OR post study benefit AND global health research OR international clinical research AND bioprospecting OR convention on biological diversity”

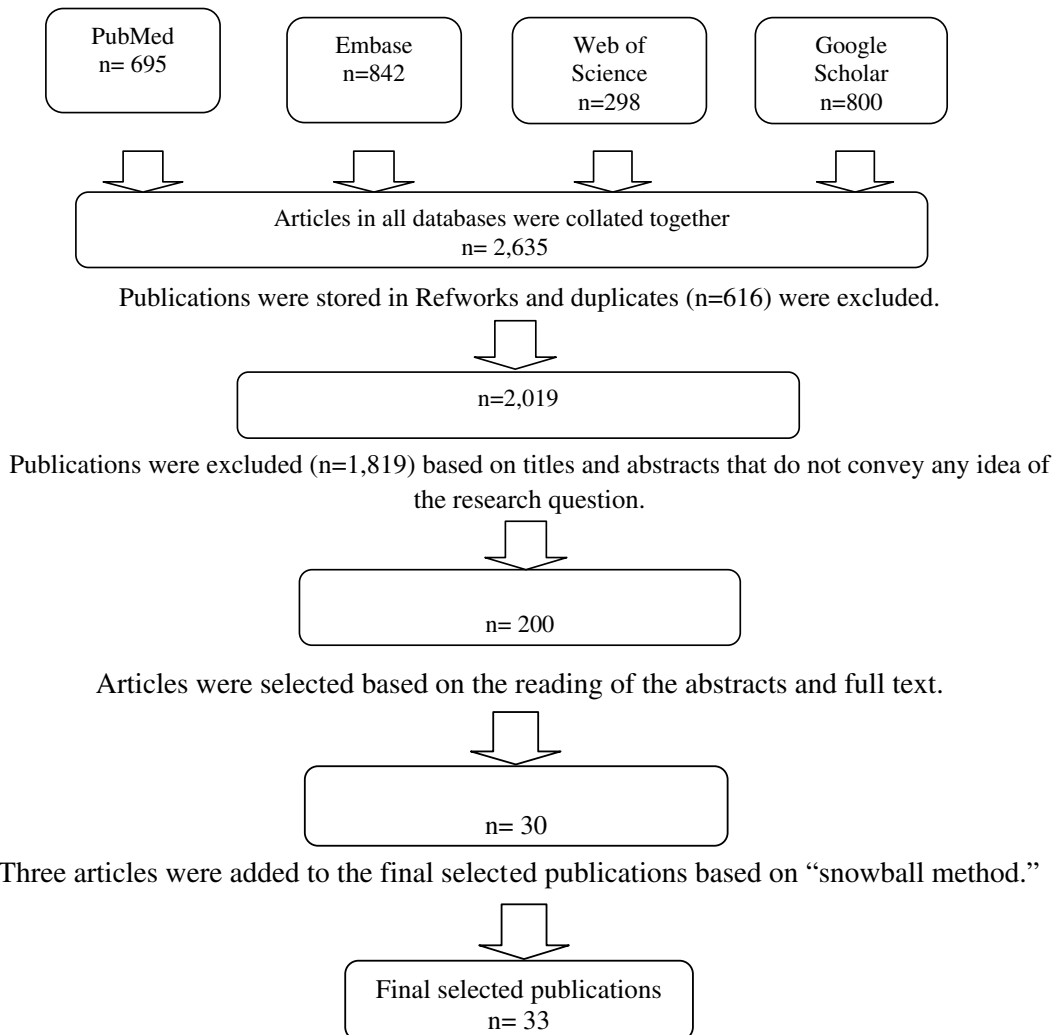
benefit sharing or fair benefits in global health research or bioprospecting. There were some overlaps as some of the publications presented two or more principles of justice and analysed the principles with benefit sharing. As such, these publications were grouped in two or more sections. The sections that follow present our results and analysis of the findings.

**Results**

The initial search returned 2,635 publications from the four databases. Using the web-based database, Refworks, 616 duplicates were removed (Figure 1). After reading the title of the publications and some

abstracts, 1,819 publications were further excluded, leaving two hundred publications. Publications were excluded if their title or abstracts do not convey any idea of relevance whatsoever to the research topic. Reading of the abstract and full text of the publications narrowed the selected publications to thirty and the snowball method further added three publications. A total of thirty-three publications were finally included for the study. The publications included in the study are recorded in Table 2.

From these publications, we extracted five principles of justice that are linked to the benefit sharing concept in global health research or bioprospecting activities. These principles of justice are:



**Fig. 1** Database search of articles and selection process

1. Commutative justice or justice in exchange
  2. Distributive justice
  3. Global justice
  4. Procedural justice
  5. Compensatory justice
- We noted that commutative justice and distributive justice appeared to be the most predominant principles linked to benefit sharing in the reviewed publications. Distributive justice has been mentioned in more publications than commutative justice (Table 1); nonetheless,

**Table 2** Principles of justice analysed within the concept of benefit sharing: Overview

Principle of Justice	Main ethical stance on benefit sharing	Limitation in application to benefit sharing	References
Commutative justice	Fair exchange of goods and resources	Only applied to countries that own exchangeable resources	Bachmann 2011. De Jonge and Korthals 2006. De Jonge 2010. Dauda and Dierickx 2013. Korthals and De Jonge 2009. Schroeder 2007. Schroeder 2009. Schroeder and Lasén-Díaz 2006. Schroeder and Pisupati 2010. Schroeder and Pogge 2009.
Distributive justice	Distribution of benefits based on <i>need</i> of poor populations	Uncertainty on which research stakeholder is responsible for benefit sharing	Castle and Gold 2007. Dauda and Dierickx 2013. Vermeylen 2007. HUGO 2000. HUGO Ethics Committee 2000. Hughes 2014. Pullman and Latus 2003. Simm 2005. De Jonge and Korthals 2006. Schroeder and Lasén-Díaz 2006. Schroeder and Pisupati 2010. Schroeder and Pogge 2009.
Global justice	Similar to distributive justice but more cosmopolitan perspective	Similar to distributive justice	London 2005. Ballantyne 2010. Millum 2010. Pratt and Loff 2011. Pratt and Loff 2014. Resnik 2004. Simm 2007a. Simm 2007b. Chennells 2010.
Procedural justice	Ensures fair procedures of benefit sharing agreements	Problem of imbalance in negotiation power between affluent and poor parties.	Bachmann 2011. De Jonge 2010. Brody 2010. Ballantyne 2008. Participants 2004. London and Zollman 2010. Schroeder and Pisupati 2010. Coolsaet and Pitseys 2015. Vermeylen 2007.
Compensatory justice	Compensation for the inconveniences of research participants	Limits benefits only to <i>direct</i> research participants	Ndebele, Mfutso-Bengo, and Mduleza 2008. HUGO Ethics Committee 2000. HUGO 2000. Simm 2005. Simm 2007a. Simm 2007b.

the two principles were mostly discussed in relation to each other. Global justice is the third most mentioned principle of justice along with procedural justice. While global justice is envisaged as a principle that broadens the course of distributive justice, procedural justice is noted to be relevant in ensuring fairness of procedures in both commutative and distributive justice. Compensatory justice was noted to be the least mentioned principle. In the following paragraphs, we present detailed findings on each of the justice principles.

### Commutative Justice

Commutative justice or justice in exchange refers to the principle of justice in relationships between individuals or groups, with specific respect to the *equitable* exchange of goods and fulfilment of contractual obligations (Sadurski 1984). Commutative justice has been outlined as one of the fundamental reasons for benefit sharing. According to Schroeder and Lasén-Díaz:

the justification for benefit sharing ... relies on a mutually beneficial instrumental approach. In Aristotelian terms, one is dealing with “commutative justice” or justice in exchange, where each party gives one thing and receives another, with a focus on the equivalence of this exchange (Schroeder and Lasén-Díaz 2006, 137).

The association between commutative justice and benefit sharing is mostly reflected within the broader discourse of the CBD. The CBD is an international legal treaty that aims at the conservation of biological diversity, sustainable use of its components, and fair and equitable sharing of benefits arising from the utilization of resources. In principle, the CBD ascribes sovereign rights to nation states over non-human genetic resources found within their national boundaries. Bioprospecting researchers wishing to use biological resources in states not within their sovereignty have to abide with the requirement of benefit sharing. This requirement is justified by commutative justice, which emphasizes that communities in developing countries with sovereign rights over their resources should be compensated in a fair way with other goods from the bioprospecting researchers. In other words, commutative justice places benefit sharing as an instrument for a *fair* exchange of goods with emphasis on *how much* a party receives in exchange with other goods (De Jonge and Korthals

2006; Schroeder and Lasén-Díaz 2006; Schroeder 2007; Korthals and De Jonge 2009; Schroeder 2009; Schroeder and Pogge 2009; De Jonge 2010; Schroeder and Pisupati 2010; Bachmann 2011; Dauda and Dierickx 2013)

The main problem of commutative justice as a basic principle for benefit sharing, as outlined in some publications, is that it only has a narrow justification for benefit sharing. Authors have argued that commutative justice marginalizes poor states and communities that have no biological resources due to its narrow focus on exchange of resources with communities that possess biological resources. Only when you have resources can you share in the benefits; when you don't, you cannot (De Jonge and Korthals 2006; Korthals and De Jonge 2009; Schroeder and Pisupati 2010). Consequently, authors have suggested that commutative justice should be combined with distributive justice (discussed in the next section) in justifying benefit sharing. They suggest that a combination of the two principles of justice would conceptualize benefit sharing not just as exchange that is based on possession of biological resources, but also as an exchange that is based on background disadvantages of poor communities (De Jonge and Korthals 2006; Korthals and De Jonge 2009; Schroeder and Pogge 2009; Schroeder and Pisupati 2010). Schroeder and Pogge maintain that:

CBD affords at best a partial remedy to the provision of basic needs ... [however], it is much more compelling to share benefits where it contributes to the fulfillment of basic needs and hence to the promotion of distributive justice (Schroeder and Pogge 2009, 278).

### Distributive Justice

Distributive justice concerns matters of access to scarce resources among a group of people or a population. It deals with allotment of privileges, duties and goods in accordance with people's needs, contribution, or responsibility; resources available to the society; and societal or organizational responsibilities with regard to the common good (Van Parijs 2007). The principle of distributive justice implies that society has a duty to people in serious need and that all citizens have duties to others in serious need (Daniels 2008).

The reviewed publications show that the principle of distributive justice is linked with benefit sharing in both bioprospecting research (De Jonge and Korthals 2006; Schroeder and Lasén-Díaz 2006; Castle and Gold 2007; Vermeylen 2007; Schroeder and Pogge 2009; Schroeder and Pisupati 2010) and global health research (HUGO 2000; HUGO Ethics Committee 2000; Pullman and Latus 2003; Simm 2005; Hughes 2014; Dauda and Dierickx 2013). The publications indicated that most developing countries have the problem of lack of basic health care services and social infrastructures—unlike the industrialized countries, where such problems are either absent or only exists on a minimum and fragmented scale. Based on these differences, the publications shared the view that global health research and bioprospecting research should strive at closing the global inequality gap through just distribution of research benefits to poor countries (HUGO 2000; HUGO Ethics Committee 2000; Schroeder and Pogge 2009; Hughes 2014).

Praat and Loff (2011) expresses that there is confusion as to which research stakeholder should bear the responsibility of distributive justice in order to perform benefit sharing in research. She noted that international guidelines mention different research stakeholders as responsible for benefit sharing. For example, while the Declaration of Helsinki mentioned “physician” as responsible for benefits, the UNESCO’s 2005 Universal Declaration on Bioethics and Human Rights (UDBHR) mentioned “nation states.” Consequently, she noted that research sponsors are not solely obliged to perform the duties of benefit sharing based on the principle of distributive justice (Pratt and Loff 2011). However, in a counter-observation, London (2005) noted that research sponsors have an obligation of human development in developing countries through global health research and benefit sharing (London 2005). He argued for a human-development approach in research which emphasizes the need to place the obligations of research benefits on a broader justification of *global justice* and to take into consideration the responsibilities of other international research actors and organizations (London 2005).

### Global Justice

Global justice is a philosophical concept that stems from cosmopolitanism—a concept that envisages people as *global citizens* (McGrew 2004). The notion of global justice presumes that just distribution of resources is not

restricted to nation states and their national borders but extends beyond national boundaries to strangers and foreigners without preference for any one person over the other (Pogge 2001). Accordingly, as globalization takes place in other aspects of human development, such as trade and the economy, health and healthcare research should also be part of this human development endeavour. As such, international health research should uphold global justice for health and provide research benefits in order to develop the healthcare system of the world’s poor.

The reviewed publications argue that global justice can be promoted through fair distribution of research benefits in resource-poor settings. The publications accentuate global justice as a form of distributive justice that takes into consideration the inequality of social goods such as healthcare that exist on a global scale (Resnik 2004; London 2005; Simm 2007a, 2007b; Ballantyne 2010; Chennells 2010; Millum 2010; Pratt and Loff 2011; Pratt and Loff 2014). Millum noted that because the world is now a globalized community, the requirements of justice should not end at national borders but should be based on a broader concept of global justice (Millum 2010). Other authors suggest that the most suitable way of promoting global justice through benefit sharing is by supporting sustainable access to proven medications as well as embarking on research projects that are responsive to the health priorities in host communities (Resnik 2004; Pratt and Loff 2011, 2014). Yet other publications further suggest that the provision of benefits should aim at improving the poor social infrastructures in developing countries. They noted that medical research should be linked to the contemporary discourse of social determinants of health—that is, economic and social conditions that influence the health of people and communities. And, based on global justice principles, research sponsors should return benefits that would address these social determinants of health and improve the general social conditions and poor health in developing countries (London 2005; Chennells 2010).

### Procedural Justice

Procedural justice concerns the fairness and transparency of the processes by which decisions are made in a given transaction (Ambrose and Arnaud 2005). In contrast to distributive justice, which concerns fairness in *outcome* of the distribution of goods and resources;



procedural justice deals with the *process* or *procedures* that are involved in order to realize fair outcomes in the distribution. As such, the basic idea is that whatever arises from a just procedure by just steps is in itself considered to be just.

Some of the reviewed publications outline the meaning of procedural justice in relation to benefit sharing in both bioprospecting and global health research (Participants in the Conference on Ethical Aspects of Research in Developing Countries 2004; Vermeulen 2007; Ballantyne 2008; Brody 2010; De Jonge 2010; London and Zollman 2010; Schroeder and Pisupati 2010; Bachmann 2011; Coolsaet and Pitseys 2015). The publications emphasize that procedural justice in bioprospecting research requires prior informed consent (PIC) and mutually agreed terms (MAT). In other words, only upon the fulfilment of these two requirements—PIC and MAT—in bioprospecting interactions, is benefit sharing considered to be fair and appropriate (Vermeulen 2007; Brody 2010; De Jonge 2010; Schroeder and Pisupati 2010; Bachmann 2011; Coolsaet and Pitseys 2015). Other reviewed publications emphasize the need for procedural justice in benefit sharing from the perspective of global health research. The emphasis stems from the fair benefit approach of benefit sharing. The fair benefit approach requires that host communities or their representative negotiate with research sponsors for fair benefits in any given research interaction. For such negotiations to be fair, all processes of negotiations need to be transparent and parties ought to have equal bargaining power in the transaction (Participants in the Conference on Ethical Aspects of Research in Developing Countries 2004; Ballantyne 2008; London and Zollman 2010).

However, some of the publications expressed concern on whether the procedural justice approach can actually ensure fair benefit sharing in the context of global health research. This concern stems from the power and economic asymmetry that characterizes the relationship between the research sponsors and the host research community. Authors have argued that research sponsors are likely to exert greater influence and bargaining power than the host communities, who are mostly vulnerable (London and Zollman 2010). Based on this imbalance in power and vulnerability, it is difficult to ascertain if the host communities are fully engaged or have the capacity to negotiate for fair benefits. Because of their vulnerable status, host communities might likely agree with *any* benefits even if the

procedures in negotiating benefits are not truly fair (Ballantyne 2008; Ballantyne 2010; London and Zollman 2010). For example, Vermeulen explains that in an interview conducted with the San community of Southern Africa, only a few knew about the benefit sharing agreements and others complained that their viewpoints on the agreements were not asked, let alone that they were actively involved in the negotiations process (Vermeulen 2007).

### Compensatory Justice

The principle of compensatory justice refers to the need for people to be fairly compensated for the disadvantages they are exposed to. It concerns recompense for the losses suffered and aims at restoring the status quo of the disadvantaged group. In order to be just, compensations are required to be proportional to the losses inflicted on a party (Hill 2002).

The meaning of the compensatory justice principle in the nuances of benefit sharing stems from the fact that participants have contributed time and effort in addition to risk exposure in research and should therefore be compensated fairly (HUGO 2000; HUGO Ethics Committee 2000; Simm 2005, 2007a, 2007b; Ndebele, Mfutso-Bengo, and Mdluluzo 2008). Simm summarizes compensatory efforts in benefit sharing as follows:

The risks posed to participants in clinical trials can be serious and direct, as new medical interventions are tried out and evaluated. Benefit sharing within this context would be a compensatory activity geared towards those who have taken risks and accepted the possible inconveniences that are necessary if research is to take place and possibly succeed (Simm 2007a, 11).

The reviewed publications outlined a limitation of the principle of compensatory justice as applied to benefit sharing. The principle limits benefit sharing obligations only to the direct research participants and not to the entire communities. This is because, in accordance with the principle of compensatory justice, only direct research participants experience risks and injuries related to research and thus deserve compensation (HUGO Ethics Committee 2000; Simm 2005, 2007a). However, Hughes (2014) counteracts this argument by stating that research often places burdens not just on individuals but also on the host community as a whole,

most often by placing burdens on the community's public resources. For example, research sponsors may use the clinic of a community; furthermore, the staff of the clinic may be involved in the research, thereby reducing the time they are supposed to spend on direct medical care to patients in general. As such, Hughes asserts further that if research sponsors place burdens on a community with limited means, they should provide some form of benefits to the community, such as providing hospital equipment, providing potable drinking water, building community halls, and so on. These may serve as fair compensations to the host community (Hughes 2014).

## Discussion

This is the first review that systematically analyses what justice in benefit sharing actually means, when taking the relevant publications on the theme in close review. The analysis provided in our results indicates that the principles of justice provide good justifications for benefit sharing in both global health research and bioprospecting activities. However, each principle of justice in this review provides a peculiar justification for a different benefit sharing rationale. In other words, each principle has situated benefit sharing in a different form of distribution of health research goods and resources. For example, the principle of commutative justice supports a benefit sharing rationale with a focus on equal exchange of resources between the parties involved in a research activity. Benefit sharing is, as such, envisaged as a tool for exchange of goods and resources between research sponsors and host communities (Dauda and Dierickx 2013). The parties involved are envisaged to possess equal rights in the transaction and are able to negotiate for goods without any external influence. Denier summarizes this notion: “all actors in the exchange should be considered as free and equal economic subjects whose personal differences in class should not play a role [in a negotiation] on the market” (2007, 14). The implication of this principle of commutative justice, as it applies to research benefit sharing, is that global health research can be reduced to a market-like transaction. In principle, researched communities can enter into a bargain with the research sponsor on what benefits to exchange in research. In reality, however, researched communities do not have good bargaining power. Because they enter a research project

in order to access basic healthcare goods, they would often be willing to accept research benefits that may not actually be fair (Ballantyne 2010). In other words, in situations of enormous inequality of bargaining power, as is the case between impoverished research populations and for-profit research sponsors, open bargaining about the distribution of benefits is unlikely to result in the research population receiving more than a minimal share of the surplus benefit (London and Zollman 2010).

Consequently, commutative justice as applied to benefit sharing could turn research activities into what London calls an “auction block,” whereby research sponsors could selectively conduct research in communities with minimal benefits demands in order to maximize their profits (London and Zollman 2010). As such, the review findings suggest that the principle of commutative justice in itself is insufficient as a justification for benefit sharing in global health research.

Our results indicate that authors are in favour of combining commutative justice with distributive justice principle in justifying benefit sharing (De Jonge and Korthals 2006; Korthals and De Jonge 2009; Schroeder and Pisupati 2010). This is because distributive justice takes into account the background conditions of individuals or groups involved in a transaction (Denier 2007). This implies that the benefit sharing rationale from a distributive justice perspective would consider the inequalities—the differences in power and research influence between researched communities and research sponsors—in its benefit sharing formulation. Benefit sharing understood within the light of the principle of distributive justice is, therefore, a cooperative interaction whereby the impoverished researched communities are given benefits due to their background disadvantages (Ballantyne 2010). We uphold the review results that distributive justice should be combined with commutative justice because they both complement each other in justifying benefit sharing. While commutative justice ensures that the researched communities receive the benefits they deserve in a fair exchange, distributive justice would consider the health needs and poor backgrounds of the researched communities in benefits distribution.

Furthermore, our review showed that distributive justice and global justice are similar because they both aim at distributing benefits with consideration to the least advantaged group. However, their major difference is in the scope of their application. While global justice has a wider scope of benefit distribution beyond the

boundaries of a nation state, distributive justice focuses mainly on distribution of benefits among citizens within a nation state. The global justice principle is thought to be important in a globalized world where there is increasing global interaction and cooperation between nation states with different political and economic structures (Miller 2008). The similarity between distributive justice and global justice is reflected in Rawls' seminal works. In *A Theory of Justice*, Rawls establishes that distributive justice comes into play only within the context of society's basic structures. And only persons with shared basic structures have claims upon and responsibility to each other arising from considerations of distributive justice (Rawls 1999a). However, in *The Law of Peoples*, Rawls incorporates a more global (international) justice approach to distribution of goods. He proposes a duty to assist other people living in unfavourable conditions that prevent their having a just or decent political and social regime (Rawls 1999b).

With regard to the procedural justice principle, our review indicates that the principle supports other principles of justice in benefit sharing (Bachmann 2011). This is because the principle is concerned with how decisions are being made in any exchange or distribution of resources. For example, if a benefit sharing rationale follows a commutative justice principle, then procedural justice strengthens this benefit sharing rationale by ensuring that the processes involved in applying the commutative justice principle are strictly adhered to, and made transparent. Some theories of procedural justice suggest that fair procedures and good interaction among parties involved in a transaction can lead to equitable outcomes even if the requirements of other justice principles are not met (Bone 2003). For example, it has been shown that the good interpersonal interactions and transparency often associated with procedural justice have a stronger tendency to affect the perception of fairness in conflict resolution (Bone 2003). While we agree that this can be true for conflict resolution, we cannot ascertain that the notion of good interpersonal relationships in themselves is enough to produce just benefit sharing outcomes in a research interaction. A notion that is similar to interpersonal relationships in global health research is that of community engagement. Community engagement is the process of working collaboratively with local partners in order to build active participation and mutual respect (Tindana et al. 2007). It has been noted that community engagement is relevant in research in resource-limited countries (Tindana et al.

2007). However, further research is required to determine if community engagement alone can ensure fair benefit sharing outcomes in global health research.

Finally, our results suggest that the principle of compensatory justice justifies benefit sharing in global health research and bioprospecting. The results indicate that compensation should be obligatory in research, due to the time spent in research participation, risks associated with trial medications, efforts spent, and inconveniences that the participants and communities incur (Simm 2005, 2007a; Ndebele, Mfutso-Bengo, and Mduluzza 2008). However, it is rather unclear whether compensations for inconveniences should be seen as a form of benefit sharing (Kamuya et al. 2014). No reason is given for this obscurity. However—in our opinion—compensation in research is an obligation of the research sponsors irrespective of whether the research generates profits for them or not. For example, it is expected that research sponsors provide transportation fares for participants that have to travel to research clinics for appointments. It is also expected that the researcher provide ancillary care for any unintended effect arising from the research. Benefit sharing, on the other hand, can be argued to be applicable only when the research sponsors are set to realize profits. Furthermore, the fundamental outlook of the compensatory justice principle is focused on paying back losses suffered by a victim—with the implication that the losses are inflicted by a victimizer (Hill 2002). This has strong negative or criminal connotations which, in our opinion, are inappropriate for health research activities. Global health research is not an activity whereby research sponsors are set to inflict pain to the researched participants and communities—it is, rather, a research activity that places a priority on improving health and achieving equity in health for all people worldwide but especially in disadvantaged populations.

## Conclusion

From this reason-based review, we can conclude that the various principles of justice discussed here provide essential and fundamental arguments in favour of benefit sharing in global health research and bioprospecting. However, while we maintain that each of these principles is individually relevant, we suggest that a combination of all the principles provides a stronger reason for benefit sharing. Simm maintains a similar stance by

indicating that combining multiple justifications for benefit sharing produces different perspectives for a benefit sharing rationale (Simm 2007b). Accordingly, we recommend a benefit sharing framework that would encompass all the principles of justice in support of benefit sharing. For example, the Nagoya Protocol on Access and Benefit Sharing has a benefit sharing rationale that is based on both the commutative and procedural principles of justice (Bachmann 2011). Based on this review, we are convinced that such a framework could be more beneficial if it also encompasses the other principles of justice, such as distributive justice and global justice. Furthermore, we suggest empirical research to determine the standpoints of stakeholders involved in global health research and bioprospecting activities on the various justice reasons given for benefit sharing. This would be highly beneficial in the formulation of a good benefit sharing framework for global health research.

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