TRADE, DEVELOPMENT & THE ENVIRONMENT HUB

The Social Impacts of Coffee Trade

A Systematic Review

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The UK Research and Innovation Global Challenges Research Fund (UKRI GCRF) Trade, Development and the Environment Hub is working with over 50 partner organisations from 15 different countries. The project aims to make sustainable trade a positive force in the world by focusing on the impact of the trade of specific goods and seeking solutions to these impacts.

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Executive Summary

The trade of high value agricultural goods is often encouraged with the promise of economic growth, poverty reduction and development. However, changes in coffee markets due to de-regulation, the increasing concentration of traders and having much of the world's coffee supply controlled by a few numbers of buyers have reduced the prices paid for coffee to those down the value chain. Consequently, many coffee farmers in producer countries operate at a financial loss. This raises questions over whether coffee trade expansion benefits the economic growth, poverty reduction and development. In response, policy interventions, such as certification schemes, have also been expanding with the principal aim of supporting those downstream in the coffee value chain. However, the effectiveness of policy interventions is still widely debated in the literature.

As part of UKRI GCRF TRADE Hub's work on the impacts of global agricultural trade on people, a literature review of the social impacts of coffee trade and the effects of policy interventions as empirically found in studies was undertaken. This was with the overarching aim of understanding the social impacts of coffee trade, and how these are modified by interventions. To assess this, the concept of multi-dimensional well-being was employed.

The main findings of the review are fourfold:

1. Coffee trade mostly negatively impacts the well-being of smallholder coffee farmers, which is often due to market related drivers. The negative impacts were mainly income-driven: coffee trade's negative effects on farmer's income had negative knock-on impacts to other well-being dimensions such as health and nutrition.
2. Policy interventions mainly concerned certification, which generally reduces the negative and enhances the positive impacts to well-being of coffee trade. This was primarily achieved by improving coffee farmers' income by increasing the prices gained for coffee and coffee yields. Income gains then had knock-on positive impacts for health, living standards, education and freedom of choice dimensions.
3. Conceptually mapping the relevant indicators of well-being onto the respective Sustainable Development Goals indicated that coffee trade generally fosters sustainable development (with strongest evidence for SDG 1, 4 and 8), but only with the assistance of interventions. Too little evidence was available for SDG 5 on gender equality to provide robust recommendations.
4. Different policy interventions sometimes had varying effects on different dimensions of well-being. Social certification schemes, for example, slightly differed from environmental certification schemes when impacting income. This was chiefly due to economic factors linked with pricing, payment arrangements, coffee production costs and yields feasible under certain regulations. The policy interventions adopted by business, governments and other stakeholders should be considered alongside which dimensions of well-being they intend to affect

The review findings hold relevance to businesses and governments seeking to improve the sustainability of their coffee supply chains. Further research is needed on the lesser studied but important dimensions of well-being, policy interventions such as supply chain interventions, scales of study and on different value chain actors to provide a more complete account of the sustainability of coffee trade. The review also recommends directions for further empirical study and data collection based on the literature gaps identified.

Contents

Figures and Tables

List of Abbreviations

ETN: Ethnography

FGD: Focus Group Discussion

FS: Field Survey

FT: Fair Trade

GCRF: Global Challenge Research Fund

GDP: Gross Domestic Product

JDE: Jacobs Douwe Egberts

KII: Key Informant Interview

N: Number

NGO: Non-Government Organisation

SDGs: Sustainable Development Goals

SLF: Sustainable Livelihoods Framework

SS: Standardised Survey

SSI: Semi-Structured Interview

UKRI: UK Research and Innovation

UN: United Nations

USD: U.S. Dollars

UTZ: Universal Trade Zone

VSS: Voluntary Sustainability Standards

4C: 4 Certification

1 Introduction and Background

1.1 Purpose of the study

The expansion of trade in agricultural goods is often promoted with the promise of overall economic growth, as well as poverty reduction and development. Although there is no clear relationship between GDP per capita and trade in unprocessed agricultural goods, including smallholders into (often highly informal) export supply chains is arguably a powerful factor in poverty reduction [1]. However, especially low-income countries face high trade barriers and costs, and not all agricultural commodity trade is sustainable or fair. The increasing global demand for high value commodities, such as coffee, cocoa, soy and oil palm, raises the importance to understand whether the expansion of commodities is a force for good and contributes to the global 2030 Agenda for Sustainable Development [2].

The UKRI GCRF TRADE Hub is an international project focused on assessing the impacts of global agricultural trade on wildlife and people to provide this understanding. This TRADE Hub report focuses on people by assessing the social impacts associated with the commodity coffee and interventions in this supply chain in coffee producing countries. This is undertaken through a systematic review of empirical studies which examines the social impacts of coffee production for global trade on stakeholders from producing countries, as well as the effects of policy interventions e.g., coffee certification. To understand whether coffee trade is a force for good we use the Sustainable Development Goals (SDGs) to evaluate the sustainability of the impacts uncovered.

1.2 Literature gap

Evidence on social impacts of coffee trade tends to be scattered. We are unaware of any existing systematic reviews focusing specifically on coffee, policy interventions which uses a multi-dimensional well-being framework to assess social impacts of international trade. Other reviews focus more specifically on coffee impacts on income [3] or livelihood assets [4], which does not fully capture the social impacts. Reviews have focused on the effects of certification on agricultural production more generally rather than on coffee [5], and use small samples (16-45 papers) for meta-analysis of certification effects on income and social measures [6,7].

Our contribute to the literature is an assessment of the social impacts associated with coffee expansion that are more holistically assessed using the TRADE hub framework and multi-dimensional well-being approach to provide a more broad, meaningful, deeper and complete conception of stakeholder's livelihoods [8,9]. Using this holistic approach, we also provide a rigorous assessment of policy interventions which are not limited to coffee certification.

1.3 Context to report

1.3.1 Coffee market conditions and production

The value of coffee exports amounted to USD 20 billion in 2017/18 and the revenue of the total coffee industry is ten times higher [10]. Arabica and Robusta are the two commercial coffee varieties cultivated by producer countries. Coffee holds huge economic importance in producer countries, which generally rank low in socio-economic development metrics. Producer countries are mainly geographically situated along the global 'coffee belt', which is bounded by the tropics of Capricorn and Cancer. Over 70% of global coffee production derives from the top 5 producer countries which are Brazil, Vietnam, Colombia, Indonesia and Ethiopia respectively [10].

Due to rising consumption in emerging economies the global coffee sector risen by more than 65% since the 1990s [10]. The international coffee market normally experiences a disequilibrium of supply and demand. In the long-term, consumption has remained stable whereas production widely varies. Coffee prices are related with this market balance and current coffee markets are experiencing excess supply driving prices down [10]. Supply and demand can also change rapidly creating market volatility. Market volatility can adversely affect producers who grow the coffee only for demand, and therefore pricing, to change [10]. Low and volatile pricing puts pressure on the 25 million households currently producing coffee as part of their livelihood strategy [10]. Such pressures on coffee the sector are amplified by environment and climate pressures, such as pest and diseases and climate change, that increase coffee farmers' livelihood vulnerability through impacts on production [10].

1.3.2 The coffee value chain

How the coffee is valued and supplied to consumers follows the coffee value chain, which is characterised by 4 main stages: 1), cultivation, 2), processing, 3), roasting and 4), consumption [11]. Cultivation involves the production and picking of coffee cherry beans, often done labour intensively by hand, by farming households in the producer country. Processing, the conversion of raw coffee into dried coffee, either through the more resource intensive wet processing or dry processing is usually carried out at processing mills. Therefore, additional processing and transportation costs can be added contingent on the processing method and distance to mills. Roasting involves the roasting, cooling, blending, grinding and packaging of coffee, normally in factories within the consuming country. This adds costs linked with gas (for roasting), electricity and packaging materials. Roasting companies can often acquire their coffee from international traders who initially purchase processed coffee from producers. Over the last two decades, there has been a significant increase in the activity of traders in international coffee markets [10]. Finally, the coffee is then purchased by retailers and consumers from roasters or international traders (who act as middlemen). The largest coffee retailers worldwide include Starbucks, Costa coffee, Café Nero, McCafe, Doutor Coffee Shop and Tully's, which are Global North actors. This is indicative that most value adding activities are undertaken in the Global North.

From processing to roasting, traders and roasting companies purchase coffee from farmers usually at very low unnegotiable prices [10]. In most producer countries market liberalisation means that coffee market price signals are more directly transferred to farm gate prices. This means that producers are paid very little for coffee, sometimes less than production costs. This roaster-farmer relationship can vary by country due to factors such as supply chain efficiency, levies and export taxes [12]. Regarding the latter, India, Brazil and Uganda impose the highest export tariffs onto to green (raw) and processed coffee [10]. Furthermore, 35% of the global coffee output is roasted by the world's top 10 coffee roasters which means there are a few, large and therefore powerful market buyers. Some of the world's largest roasters include Starbucks, Nestle, Nespresso, Lavazza and JDE. This is said to further reduce farmers' bargaining power and therefore the downstream benefits to producers [10]. Over the last 20 years, roaster's and retailer revenue have significantly increased, however the benefits downstream to producers (those cultivating the coffee) have not, and in some instances declined [10]. Market liberalisation coupled with the increased concentration of traders and roasters has expanded their market power which has squeezed the prices given to value chain producers [13,14]. Furthermore, increased processing, marketing and distribution costs have also negatively affected the bargaining power of producers [12]. The

currently described unequal benefits distributed amongst value chain actors lower down therefore appears to pose significant risks to the livelihoods and well-being of producers and the sustainability of coffee production and trade.

1.3.3 Coffee certification interventions

There are various policy and private sector initiatives in the coffee sector designed to encourage sustainable and fair coffee trade and production, including certification initiatives, corporate responsible sourcing, producer support, public sector regulation and policy, and multi-stakeholder governance initiatives. This report focuses on interventions that directly affect coffee farmers, which primarily comprise coffee certification, but other non-certification interventions such as value chain approaches, including interventions like 'relationship coffee' that seek to intervene or shorten the coffee value chain, actions by coffee cooperatives that aim to increase productivity (e.g. training and profitability, supplying connections to markets), government programmes (involving any intervention by the government), farming practices (e.g. agroforestry) and 'other' are also assessed.

As part of Voluntary Sustainability Standards (VSS), roasters and retailers can use certification to implement more sustainable coffee farming practices to appeal to consumer interests and enhance the quality of their coffee, for instance, through organic coffee production. Most certification initiatives directly and indirectly target improving income by ensuring that actors lower down the value chain receive higher coffee prices. Different certification schemes have different social, economic and environmental sustainability agendas to appeal to different types of consumers. However, all usually share a common goal of benefitting producers. Some certification schemes work through the payment of price premiums directly to farmers for their coffee, whilst others also pay a premium to certified coffee cooperatives. Premiums are often paid to cooperatives on the condition that funds are invested in community development projects, such as improving schooling and healthcare infrastructure. Community investments decisions are supposed to follow a democratic process between the cooperative and community members to tackle the most pressing development issues.

The main certification schemes linked with coffee tend to be Fair-Trade, Rainforest Alliance, UTZ and Organic, though there are various others in private and non-private sectors, including C.A.F.E., 4C, Nespresso AAA, Fair Trade Organic and other less common niche certification schemes such as 'harvested by women' [15]. In this report, these certification schemes are grouped into more social orientated and more environment orientated certifications based on their principles or criteria, as well as the descriptions provided in papers. For instance, 4C certification entails 17 socio-economic and 10 environmental principles, thus constituting a more social orientated intervention. Fair-trade, unlike other certification schemes, has requirements on pricing through minimum pricing and premiums that focuses mainly on benefiting smallholder coffee farmers [10,11]. Rainforest Alliance and Organic certification focus mainly on environmental and biodiversity protection and the alleviation of agrochemical practices. UTZ generally aims to improve coffee farming practices whilst ensuring that coffee is produced in line with basic working rights, growing conditions and environmental laws. In contrast to Fair-Trade, UTZ, Rainforest Alliance and Organic certification do not guarantee minimum prices but can distribute higher coffee prices to producers paid by conscious consumers. Finally, "aggregated certification" pertains to studies whereby the effects of various certification interventions are considered, or grouped, together.

1.3.4 Section Summary

Given the potential threat associated with coffee production and trade to the livelihoods of actors lower down the value chain, our systematic review provides understanding if and how people's well-being is impacted using a multi-dimensional concept of well-being, and whether interventions like certification can change these impacts. This supports the TRADE Hub's remit and provides understanding of the social sustainability of coffee trade.

The report is structured as follows. Next, the systematic review method followed is described (section 2). In the subsequent results section (section 3), the report first presents the descriptive statistics of the sample (section 3.1) and methods and indicators used to assess impacts (section 3.2.1) and interventions (section 3.2.2). The results section then presents the direct social impacts (section 3.3) before disaggregating impacts by intervention type (section 3.4). Next, the drivers of social impacts are explored (section 3.5) before exploring the differences recorded across different value chain actors and groups (section 3.6) and any trade-offs between well-being dimensions (section 3.7). The results section finishes with a description of the wider socio-economic impacts of coffee trade (section 3.8). Section 4 provides a discussion of the key findings (section 4.1) and recommendations for future studies (section 4.2). Section 5 states the report conclusion.

2 Methodology

2.1 Objectives of the review

We performed a systematic literature review with the aim to assess the social impacts of international coffee trade and how interventions modify this. The literature review was conducted with the aim of answering the following research questions (***Table 1***).

Table 1: research questions, and their rationale, to the review.

	Research Question	Background/rationale
1	**What tools and metrics are used to assess the effects of coffee trade expansion on well-being?**	To provide insight for future trade-hub studies the literature review will assess which indicators and methods are applicable to examine the impacts of coffee expansion to the relevant well-being dimensions.
2	**What are the direct impacts of coffee trade expansion on well-being?**	This question is necessary to discern how coffee expansion impacts well-being, the directions of impacts and which dimensions have and have not been rigorously studied in the literature i.e., identify research gaps.
3	**What are the effects of policy and non-government interventions on the impacts to well-being?** • **How do these effects link to the SDGs?**	This question explores if policy interventions, such as coffee certification, can mitigate the negative social impacts of trade and enhance the positive impacts. This question also seeks to distinguish which policies are most effective. The sub-research question on SDGs assesses the sustainability of these interventions using the relevant SDG(s).
4	**What are the main drivers of change in these effects on well-being/poverty?**	To understand the mechanisms behind the impacts to well-being/poverty, and how policy interventions could mitigate impacts, this requires exploring the drivers creating the impacts.
5	**How do these impacts differ across groups of people and across actors?**	To gain comprehensive understanding of the well-being impacts this requires considering how different groups, such as gender and wealth groups, are affected by coffee expansion. Furthermore, as producers in the coffee value chain normally receive the fewest gains from coffee trade this research question assesses any differences in impacts across the value chain.
6	**What, if any, are the trade-offs between impacts on well-being dimensions?**	Where studies consider multiple well-being dimensions the direction of impacts may differ. This research question is necessary to examine whether there is evidence for such trade-offs from the expansion of coffee.
7	**What are the wider social-economic impacts of coffee trade?**	Those actors less directly connected to the coffee value chain, such as local community residents, could also experience socio-economic impacts linked with coffee expansion. This research questions seeks to gather evidence in studies that highlights such wider socio-economic effects.

In order to answer RQ3, we mapped these impacts onto the SDGs based on the qualitative descriptors or quantitative verifiers of the wellbeing impacts that were used in the studies. Only 3 selected studies specifically mentioned SDGs [16–18]. This mapping was therefore based on official UN SDG Indicators (https://unstats.un.org/sdgs/indicators/database/) where possible, and otherwise based on conceptual congruence.

2.2 Search strategy

The literature review focus is on empirical studies measuring direct and indirect impacts of coffee production including impacts in all producing countries. The review included two main sources of literature: peer-review literature and grey literature from a set of key organizations.

2.2.1 Peer-review literature

For the literature review an initial set of search of a list of terms was developed by reviewing the terms used in comparable systematic literature reviews on well-being/poverty topics, for instance Roe et al. (2013). The search was carried out in Web of Science's Core collection

and was refined iteratively through filtering by disciplines, document type (article and book chapters) and publication years (2000-2020) to gain an applicable and manageable number of hits. The search was conducted during June 2020, therefore the material reviewed spans the dates of January 2000 – June 2020. The final search terms, which are refined by discipline, document type and disciplines, presented in ***Table 2*** generated 3321 hits for the first abstract screening.

Table 2: Search terms

Well-being/MPI		Product
"wellbeing" OR "well-being" OR "well being" OR "income" OR "poverty" OR "human well*" OR "nutrition" OR "livelihood*" OR "security" OR "vulnerab*" OR "(social) capital" OR "human capital" OR "asset*" OR "social welfare" OR "social impact" OR "economic impact" OR "welfare" OR "poor" OR "quality of life" OR "well living" OR "living standard*" OR "utility" OR "life satisfaction" OR "prosperity" OR "progress" OR "needs fulfillment" OR "development" OR "empowerment" OR "capabilit*" OR "poverty" OR "happiness" OR "deprivation*" OR "educat*" OR "mortality" OR "wealth*" OR "marginalis*" OR "disadvantage*" OR "*equity" OR "*equal*"	AND	"coffee"

2.2.2 Grey literature

The strategy for the grey literature search involved using e-libraries and online repositories of key organization selected from lists that have been developed by comparable systematic literature reviews on well-being/poverty topics, for instance Bottrill et al. 2014 (https://environmentalevidencejournal.biomedcentral.com/articles/10.1186/2047-2382-3-16/tables/2), and the SSRN repository (https://papers.ssrn.com/sol3/DisplayAbstractSearch.cfm). Moreover, we searched grey literature across coffee sector specific sources such as private sector actors, certification bodies, sector-wide multi-stakeholder bodies and NGOs, non-academic research institutes (Annex 6.1). The search of this repositories generated a total number of reports of 327.

2.3 Inclusion and exclusion criteria

The criteria used for the literature first screening process (abstract and title) differ across academic and grey literature whilst the second screening (article/report content) is the same across the two type of documents.

2.3.1 Peer-reviewed academic literature – first screening

The literature has been screened using two sequential screening processes. The first screening regards screening the article title and the abstract whilst the second screening regards the article content.

The criteria applied for the first screening (title and abstract):

- Inclusion: Empirical study that uses primary data or present a new analysis of existing secondary data, quantitative and qualitative, based in one or more countries, and that measure some form of poverty/well-being/resilience etc. at country, sub-national, household and/or individual level, focusing on coffee production

- Exclusion: As well as opposites on the above, studies using mechanistic models, scenarios or attitudinal reviews without providing new empirical data or new analysis of secondary data sources for links between coffee and well-being/poverty; existing reviews or meta-analyses; inaccessible papers; non-English papers.

No studies are excluded based upon quality. We assumed that the academic publishing process provides a sufficiently rigorous assessment, and we acknowledged that ideas of what constitutes quality are not homogeneous.

2.3.2 Grey literature – first screening

The grey literature selection included only reports as a document type (and excluded documents such as policy briefs). To screen the grey literature, we used a three sequential screening process. First, we screened the article title, then the abstract and next the article content. The title criteria involved:

- Inclusion: Title must be relevant to the product (i.e. coffee).
- Exclusion: Titles which suggest that the study focuses on chemical or genetic analysis or suggest that the report does not provide an analysis of primary or secondary data (but rather, a review or meta-analysis).

The criteria applied to the abstracts are the same as for the peer-review academic studies.

2.4 Second screening

The criteria for the content screening are largely the same as for the title and abstract screening. The reasons for exclusion in the second screening are likely to concern not being empirical, no mention of any link of coffee to human well-being and article inaccessibility.

Following these steps (***Figure 1***), 88 academic articles about well-being impacts and 16 reports from grey literature reports remained for the analysis. The next section presents the results of the analysis for the well-being impacts.

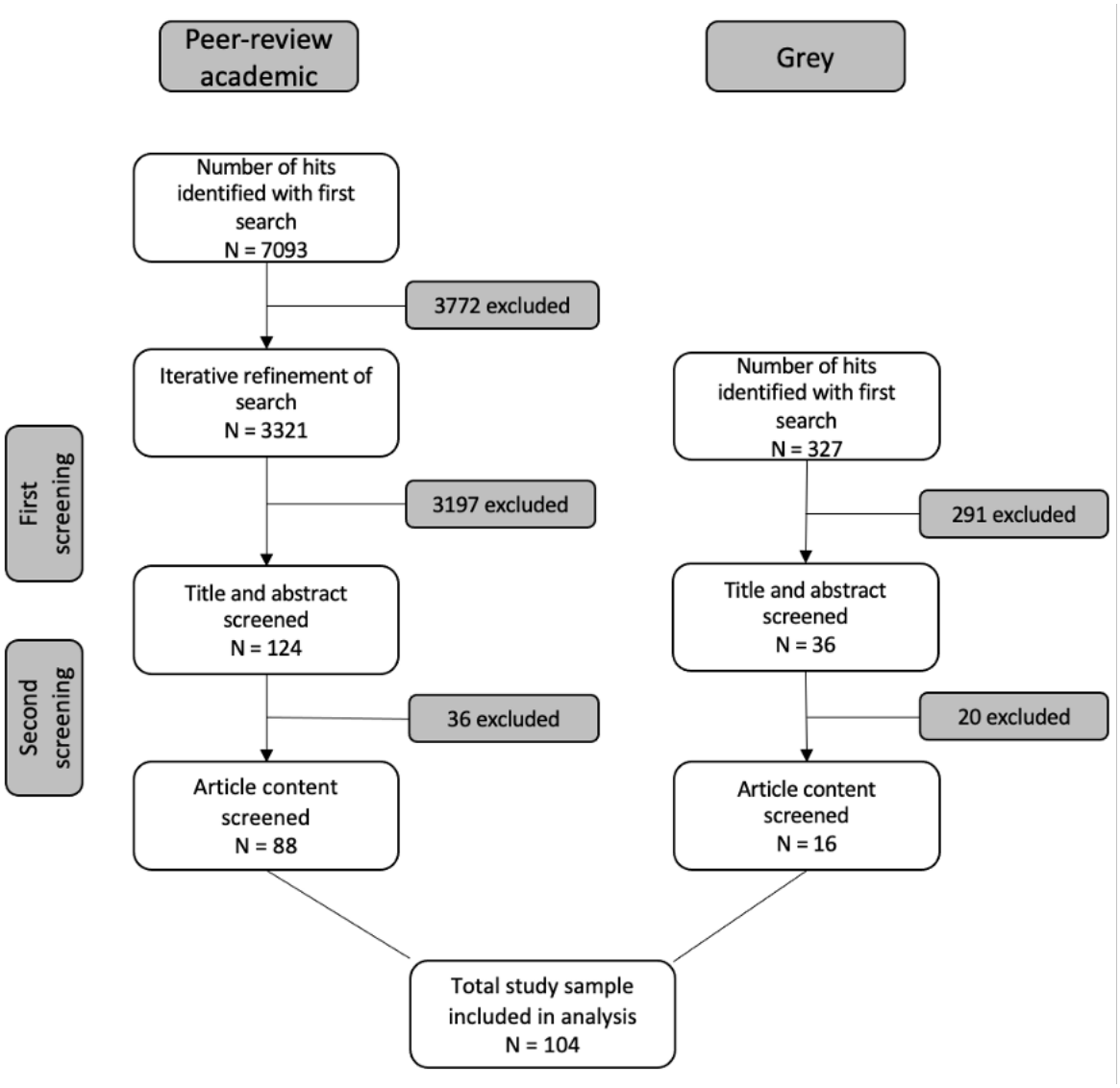


Figure 1: Systematic review process

2.5 Literature dataset and coding scheme

The articles selected after the second screening have been included in a literature dataset by first extracting all relevant information using an online survey tool (google form) and next by coding the information in a standardised way such that the literature included can be examined through quantitative methods.

2.5.1 Impacts on well-being (direct impacts)

To classify the direct impacts of coffee trade reported in the literature, we employed a multidimensional concept of well-being [20,21] (Schaafsma et al. 2021 FRAMEWORK PAPER) which includes 9 different well-being dimensions classified as outcomes, and 3 well-being dimensions classified as outputs (***Table 3***).

Table 3: Classification of well-being impacts

Well-being dimension - outcomes	Description
Health (physical)	Feeling strong and well; able bodied; and your ability to maintain your health
Food/Nutrition	The ability to provide in your personal and your households food and nutritional needs throughout the year, including food that you buy, produce yourself or collect in the area in and around your village.
Education	The ability to obtain the schooling you want personally, to send your children to school, including the required materials (e.g. books, uniforms, materials, fees)
Living standards	Shelter (adequate flooring, roofing and walls, sanitation, electricity); motorbikes or bicycles; mobile phones; farming/fishing equipment; livestock; safe drinking water; fuel.
Cultural value	Your freedom to conduct traditional, cultural, tribal and religious practices, and spiritual values, including those attached to nature.
Freedom of choice and actions	Your ability to live the life you want, with a sense of power to control and agency over your own life; according to your values and norms; being independent from the goodwill of others; including your livelihood such as a self-sustaining farmer/fisherman; the ability to choose and achieve your goals in life; and your ability to influence decisions that are made by others in your community and beyond that affect your life; to be empowered; a life without discrimination (race, gender, etc.)
Security, safety from other people	Safety and confidence in the future; peace and harmony – free from harm inflicted by other people, such crime, mugging, physical violence (incl. rape), lack of protection from police, lack of justice.
Living in safety from risk inflicted by nature, and in a clean, healthy environment	Extensive harm or psychological stress created by exposure to environmental risk Your ability to feel that your life is safe from droughts, floods, heatwaves, mudslides, storms, tsunamis, earthquakes, etc. Your ability to live surrounded by clean water in rivers and lakes, breathe clean air, i.e. live in a safe and healthy environment free from pollution Your ability to live without suffering crop losses, killings (by elephants, hippos, lions, etc.)
Social relations	Your ability to have meaningful relationships with your family and friends, to have family cohesion and respect within families, communities and external actors, your ability to help or rely on others in times of need. This includes for example your ability to care for, raise, marry and settle children, and to participate fully in society and social events such as celebrations, weddings and festivities.
Well-being dimension - outputs	**Description**
Income/expenditure	change in income or expenditures expressed it in monetary terms
Sustainable livelihood framework (SLF)	impact measured through scoring over different assets under SLF framework

For each article or report, we recorded as a single impact every empirical measure of change relative to one of the well-being dimensions described above that is associated with coffee trade. In addition, we collected a range of information regarding methods, including indicators used and qualitative themes explored, geographical location and scale of analysis of the study, sampling strategy and type of actors involved in the study as well as the direction of impact for each of these actors when heterogeneous impacts for different actors are reported.

3 Results

This section first presents the descriptive statistics of the sample of selected studies, and then addresses the findings for each of the research questions.

3.1 Descriptive statistics

By year, **Figure 2** demonstrates a general increase in the number of (selected) studies assessing the social impacts linked with coffee production since 2002. Studies peak in 2018 but it is noteworthy to highlight that 2020 was not finished at the time of the literature search.

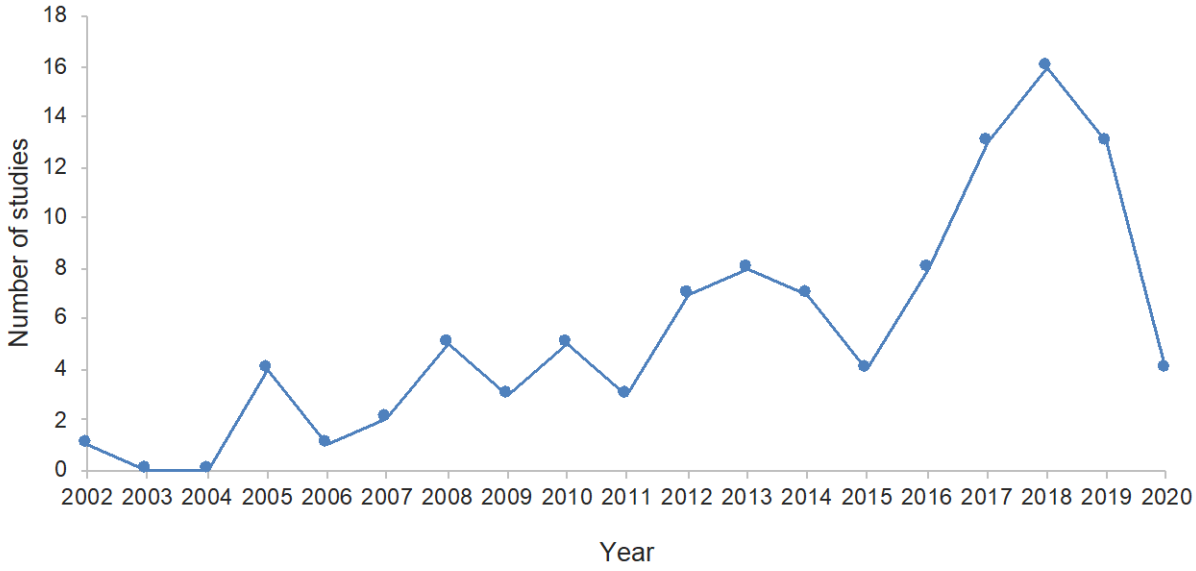


Figure 2: Number of selected studies published since the year 2000.

Most studies of the social impacts of coffee production are conducted in coffee producing North-American countries, such as Nicaragua and Mexico, as well as coffee producing African countries including Ethiopia and Uganda (***Figure 3***). ***Figure 4a*** shows that most studies are conducted in North America closely followed by Africa, whilst Oceania and Asia have the fewest respectively. Regarding TRADE hub countries, 7 studies are conducted in Tanzania, 6 in Indonesia and 5 in Brazil (**Figure 3**). Most countries in **Figure 3** represent single study countries because few studies spanned multiple countries (n=9) (see **Figure 4c**).

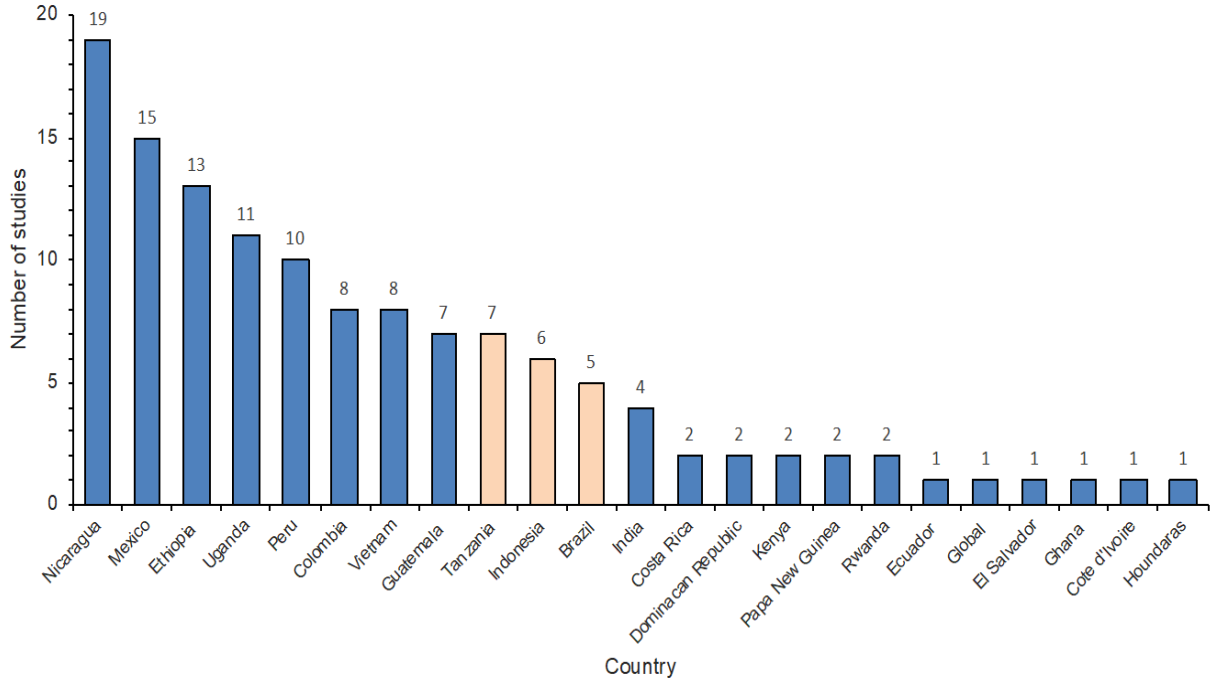


Figure 3: Number of studies per country. Trade hub countries are highlighted in orange.

Province and landscape respectively comprise the scale at which most studies are implemented, and country, region and global level studies are the least common respectively (**Figure 4**b). The majority of studies (n=94) undertook primary data collection and analysis and few used only secondary data analysis (n=10).

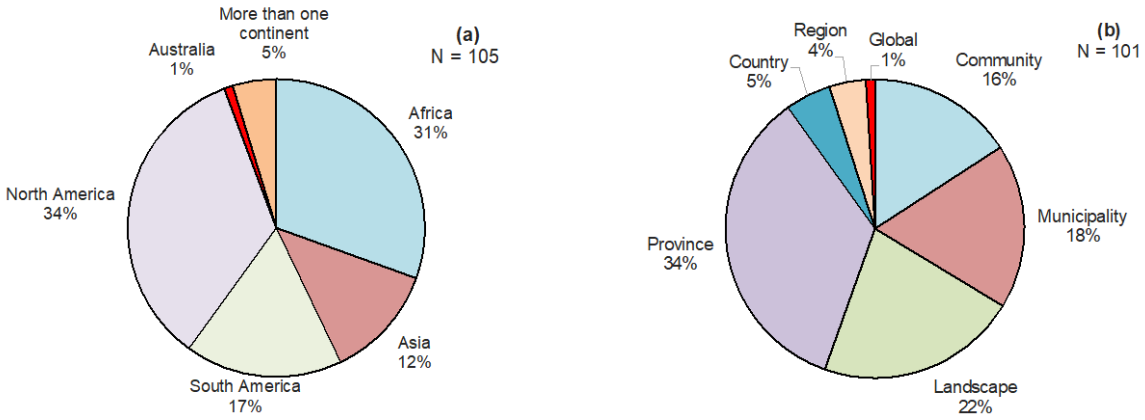


Figure 4: Distribution of the sample across continents (a) and spatial scale (b).

3.2 Methods for measuring social impacts

3.2.1 Types of data collection methods and indicators to assess social impacts

64% of selected studies employed quantitative methods and 36% qualitative methods to assess the social impacts (**Figure 5**). Various studies also used mixed methods whereby qualitative research gained contextual background insight and quantitative methods measured impacts [22,23]. These studies were categorised as quantitative because those methods measured the impacts.

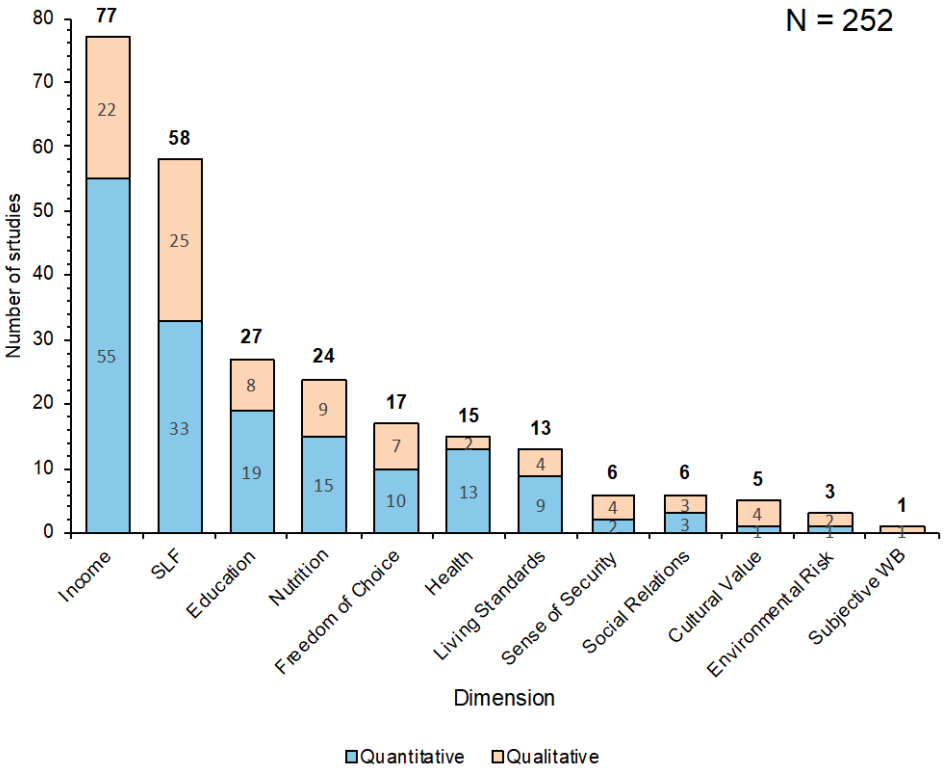


Figure 5: Number of studies using qualitative and quantitative methods per well-being dimension.

Excluding the less often studied dimensions of subjective well-being, environmental risk, cultural value, social relations and sense of security, the social impacts were primarily assessed using quantitative approaches. Surveys comprised the main quantitative data collection tool with standardised surveys (n=19), such as living standards measurement surveys, demography and health survey, national-level household budget/expenditure surveys etc, and field surveys (n=136), more tailor-made and study-specific questionnaires, used. Among the qualitative methods, semi-structured interviews (n=80), key informant interviews (n=49), ethnography/participant observation (n=38), focus groups (n=30) and rural appraisals (n=4) were used. **Table 4** lists the indicators used for assessing the impacts to each well-being dimension, as well as the common data collection method used. These indicators were grouped from more specific indicators, which are presented in annexes 6.2 and 6.3.

Table 4: Summary of indicators and methods used to assess impacts.

Dimension	Indicator(s)	SDG	Frequency (studies)	Main data collection method (quant)	Main data collection method (qual)
Income	Farming profitability	1	50	FS	SSI
	Household income	1	22	FS	SSI
	Household expenditure	1	5	FS	-
	wages	1	2	FS	SSI; FGD
	Women's income	1	2	FS	SII; FGD; ETN
	Perceived living income	1	1	FS	-
Health	Access to healthcare	3	8	FS	SSI; ENT
	Physical health impact	3	3	SS; FS	SSI
	Healthcare expenditure	3	2	FS	-
	Cooking ventilation	-	1	FS	-
Nutrition	Perceptions of nutrition	2	8	FS	FGD; KII
	Food security index	2	6	FS	-
	Food consumption measure	2	6	FS	ETN; KII; SSI
	Food security dimension	2	3	SS	ETN; KII; SSI
	Expenditure on food	-	2	SS; FS	-
	Physical measurement e.g., BMI	2	1	SS	-
Education	School attendance	4	14	FS	SSI
	Years completed	4	8	FS	KII; SSI
	Expenditure on education	-	4	FS	-
	Access to education	4	3	FS	-
Living Standards	Housing	1	6	FS	SSI; FGD
	Expenditure on housing	-	3	FS	-
	Electricity	-	2	-	SSI; FGD
	Cooking fuel	1; 7	1	-	SSI; FGD
	Sanitation	1; 7	1	-	SSI; FGD
	Perceptions of living standards	1	1	-	KII; FGD
	Ability to acquire basic household goods	1	1	FS	-
Subjective well-being	Social recognition and appreciation	-	1	-	ETN; SSI
Cultural Value	Cultural identity	-	4	-	SSI
	Ability to practice ceremonies	-	1	FS	
Freedom of Choice	Empowerment	2, 5, 8, 10	12	FS	SSI
	Participation	5, 10, 16	2	FS	-
	Gender equality	5	1	-	SSI
	Gender asset gap	5	1	FS	-
	Employment	8	1	-	SSI
Sense of security	Anxiety	1	2	FS	FGD
	Land tenure security	1	2	FS	SSI; FGD
	Fear	16	1	-	ETN; SSI
	Safety	5	1	-	SSI
Environ-mental risk	Perceptions of environmental risk	1	1	-	ETN; SSI
	Wildlife crop damage	-	1	-	SSI
	Exposure to climate risk	-	1	FS	-
Social Relations	Family and community ties	-	4	FS	SSI
	Relationships	-	2	FS	-
SLF	Financial capital asset	1, 2, 8, 9	17	FS	SSI
	Human capital asset	2, 4	15	FS	SSI
	Physical capital asset	1, 2	14	FS	SSI
	Social capital asset	-	7	FS	SSI
	Natural capital asset	1	3	FS	ETN; SSI

Note: ETN=ethnography; FGD=Focus Groups Discussions; FS=Field Surveys; KII=Key Informant Interviews; SS=Standardised Surveys; SSI=Semi-structured Interviews.

3.2.2 Types of policy intervention study designs

To discern measured effects of the policy interventions studies researching interventions often used a group(s) of respondents partaking in a policy intervention, for example certified farmers, and a control group. Differences between groups in various social dimensions are then assessed to infer positive and negative social impacts. Note that non-invention studies

did not use this approach. Non-intervention studies studied the relationship between coffee trade and social impacts without the presence of intervention.

Social certification (n=33) and environment certification (n=29) most frequently adopt this approach compared to 'other' interventions (n=11) and aggregated certifications (n=6). However, this may be accredited to more studies focusing on social and environmental coffee certifications. As a proportion of the number of policy intervention studies, 78% of environmental certification studies adopt a control group approach, 67% of aggregated certification studies, 58% of social certification studies and 42% of non-certification interventions.

We deemed the insight gained through control group approaches as robust measurements of the effects of policy interventions. We acknowledge that other approaches can be considered robust measures, but we describe the results of the control group study designs in more detail since this was the common design in the selected coffee literature.

3.3 Direct well-being impacts

3.3.1 Overview of human wellbeing dimensions studied

Studies mostly considered the impacts to stakeholder's household and individual income (n=78) and livelihood assets (n=58) (**Figure 5**). As section 3.6.2 outlines, stakeholders are predominantly smallholder coffee farmers. Impacts to stakeholder's education, nutrition, freedom of choice, health and living standards dimensions received moderate attention in studies being investigated in 27, 24, 17, 15 and 13 studies respectively. Few studies considered impacts to stakeholder's sense of security and social relations (n=6), as well as their cultural values (n=5) and environmental risk (n=3). Only one study examined the impacts on subjective well-being (individual pleasures) [24].

3.3.2 Directions of social impacts

59% of social impacts associated with coffee production were positive, while negative impacts were less common (20%) and 21% found no effect. **Figure 6**'s disaggregation by dimension also reveals that positive impacts are more frequent for most dimensions, excluding nutrition and sense of security dimensions with more negative impacts. The most positive impacts are recorded for SLF-assets (n=67), followed by income (n=51) and education (n=21), whilst the most negative social impacts are recorded for income (n=27), nutrition (n=11) and education (n=6). These impact frequencies may also be attributed to these dimensions being more commonly studied.

Proportionally, and excluding subjective well-being with only 1 impact recorded, cultural value, social relations and SLF receive the three highest proportions of positive impacts associated with coffee production with 80, 78, and 73% respectively (positive relative to negative and no impact). Regarding recorded negative impacts, sense of security, nutrition and environmental risk received the three highest proportions at 56, 39 and 34% respectively. Education, nutrition and income have the three highest proportions of no effect at 29, 29 and 24% respectively. The low sample sizes for social relations, sense of security and environmental risk are worth considering in the interpretations of these findings.

Figure 6 also demonstrates that the total number of impacts recorded in the sample reflect the dimensions that studies focus on most, e.g. income and SLF-assets, and least e.g. environmental risk and subjective well-being. It is important to highlight that SLF impacts considers impacts to each livelihood capital separately. This was necessary to capture

differences in the direction of social impacts across different livelihood capitals in studies, for example, when one capital asset increases and another decreases.

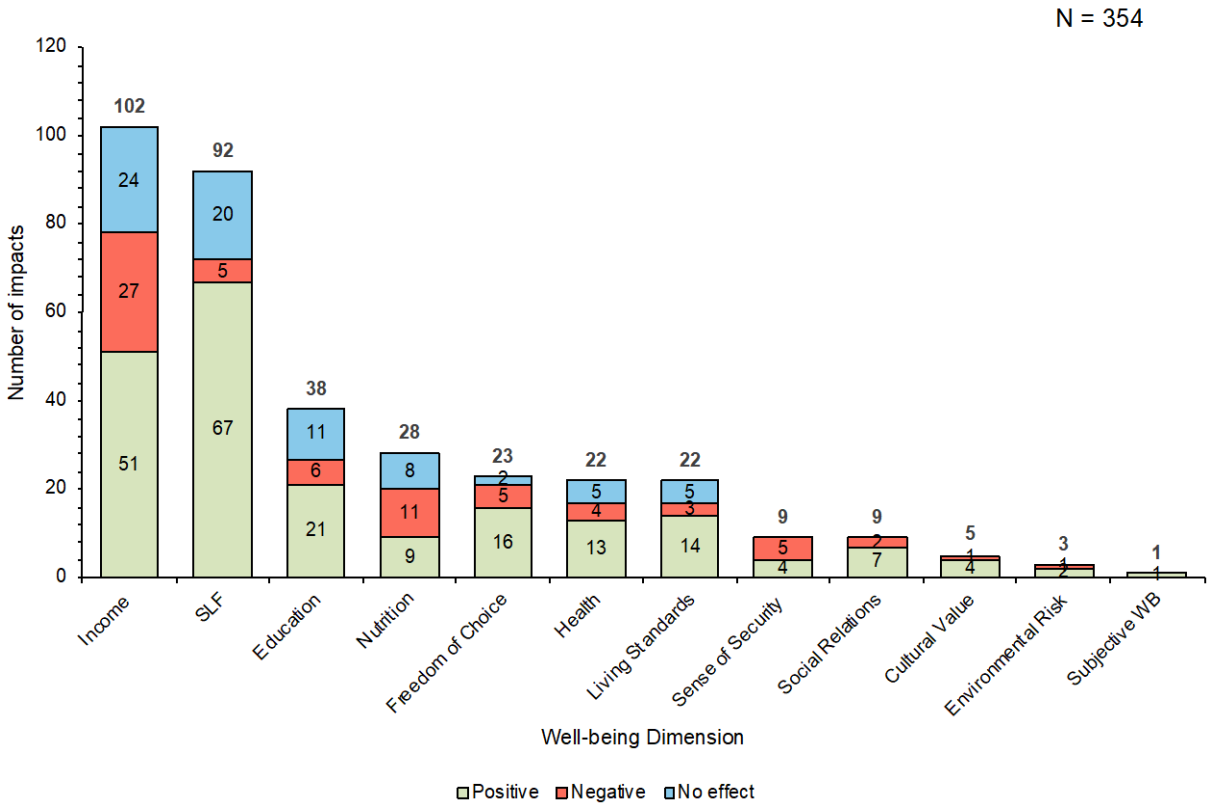


Figure 6: Frequency of social impacts and their respective directions for each dimension.

3.4 Social impacts of different policy interventions

To address RQ3, we analysed the social impacts associated with different interventions. This sub-section outlines the types and frequencies of policy interventions, such as coffee certification, assessed in the sample of selected studies (section 3.4.1). Next, the social impacts are disaggregated by non-interventions and interventions (section 3.4.3 to 3.4.3) to understand how interventions may modify impacts. The sub-section finishes with an assessment of the policy intervention outcomes in accordance with the relevant SDGs (section 3.4.5).

3.4.1 Frequencies of policy interventions

77% of studies examine the impact of a policy intervention on well-being, whereas 23% of studies do not. As **Figure 7** reveals, the effects of social orientated certification are frequently studied, followed by environmental orientated certification and other non-certification policy interventions, with aggregated certification the least commonly examined group. It is important to highlight that some studies can be represented across multiple policy intervention groups because these examined multiple policy interventions (n=28).

Fair Trade was the most the common policy intervention studied comprising well over half of the social certification group (n=41) followed by Organic (n=18), Fair-trade Organic (n=10), UTZ (n=9) and Rainforest Alliance (n=8) (**Figure 7**). Regarding non-certification interventions, coffee cooperatives were the most studied (n=12) followed by government intervention (n=5) and value chain approaches (n=4).

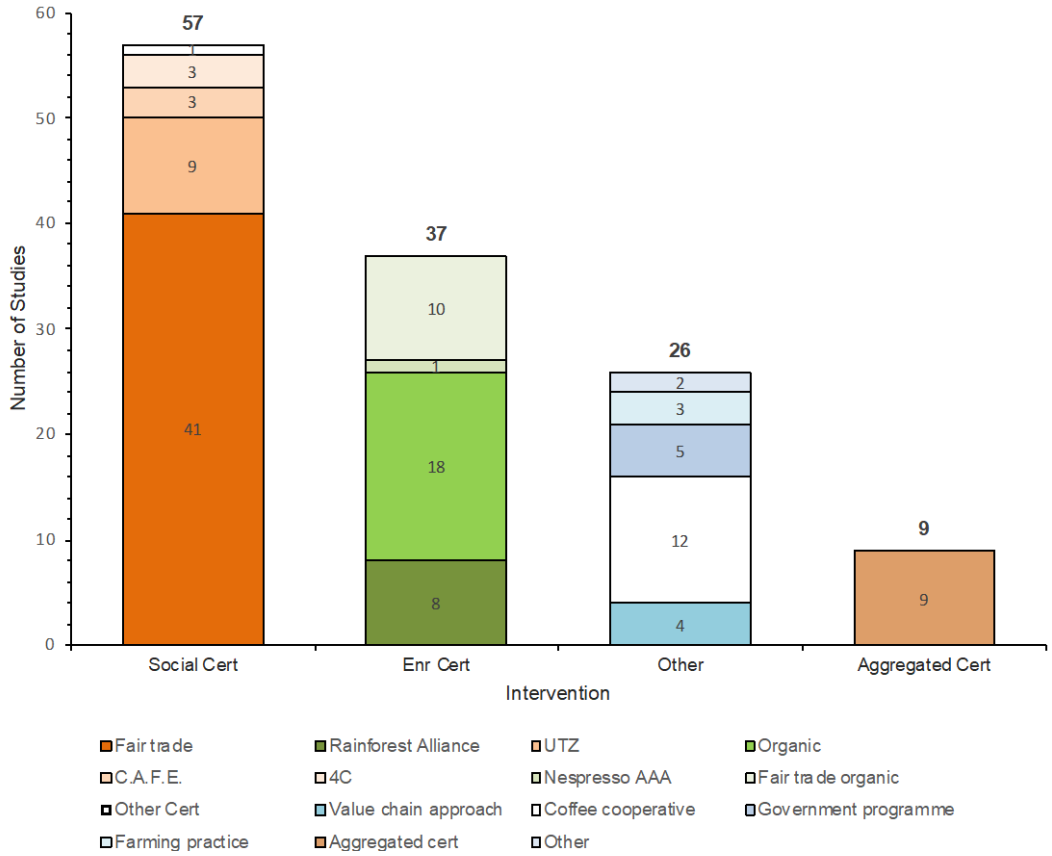


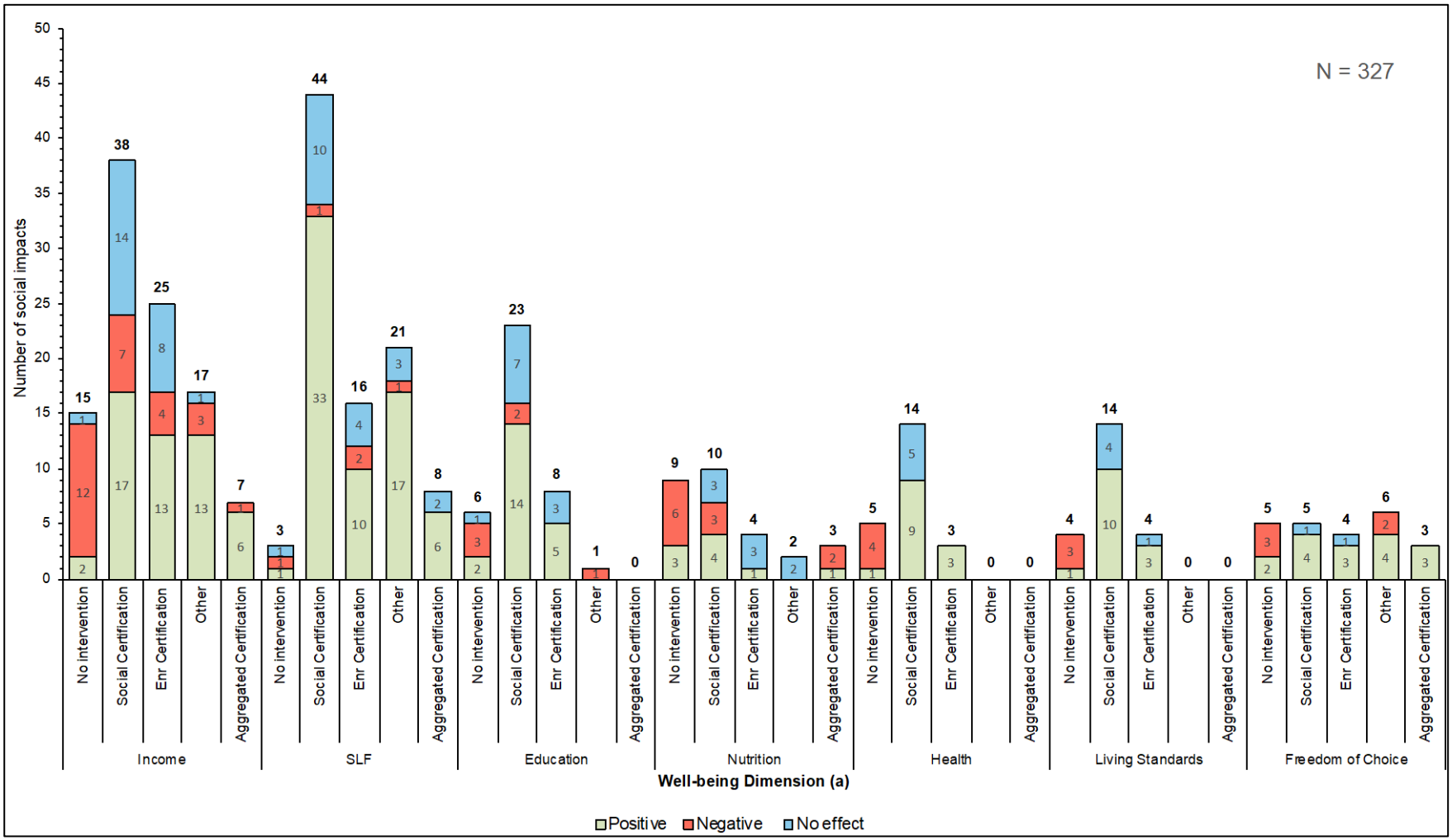
Figure 7: Number of studies examining different interventions.

3.4.2 Disaggregation of social impacts by intervention

Policy intervention studies mainly consider income, SLF-asset and education dimensions, which are primarily social and environmental coffee certification, and assess impacts to living standards, health and nutrition dimensions less (**Figure 8**a). Corresponding with **Figure 7**, **Figure 8**a also reveals greater counts for social and environmental certification groups than other policy interventions. Freedom of choice is the only dimension whereby counts of impacts from a non-certification related intervention are the highest. This could be because women's empowerment and equality indicators of freedom of choice may not fall within the remit of coffee certification programmes (potentially except for Fair-Trade), and require more specific focused interventions, such as 'Café de Oro' which market women's only coffee and fund women's development projects [25].

The selected studies show that proportionally more positive and fewer negative impacts are recorded for policy interventions compared to no intervention (**Figure 8**a). This is especially true for income, health and living standards. Refining the policy interventions results to those derived through a control group study (**Figure 8**b) shows a lower number of positive counts in the social certification group. This could imply that when studied with stricter designs, the effects of social certification interventions reflect somewhat lesser success. For income, for example, positive impacts are the most common in **Figure 8**a whereas results of no effects on income was most common in **Figure 8**b. Regarding their respective trends, **Figure 8**b exhibits an identical trend to **Figure 8**a for policy intervention and non-intervention groups. This suggests that proportions of positive, negative and no effects do not vary greatly across study designs.

(a)


N = 327
Number of social impacts
Well-being Dimension (a)
Income
SLF
Education
Nutrition
Health
Living Standards
Freedom of Choice
No intervention
Social Certification
Enr Certification
Other
Aggregated Certification
Positive
Negative
No effect

(b)

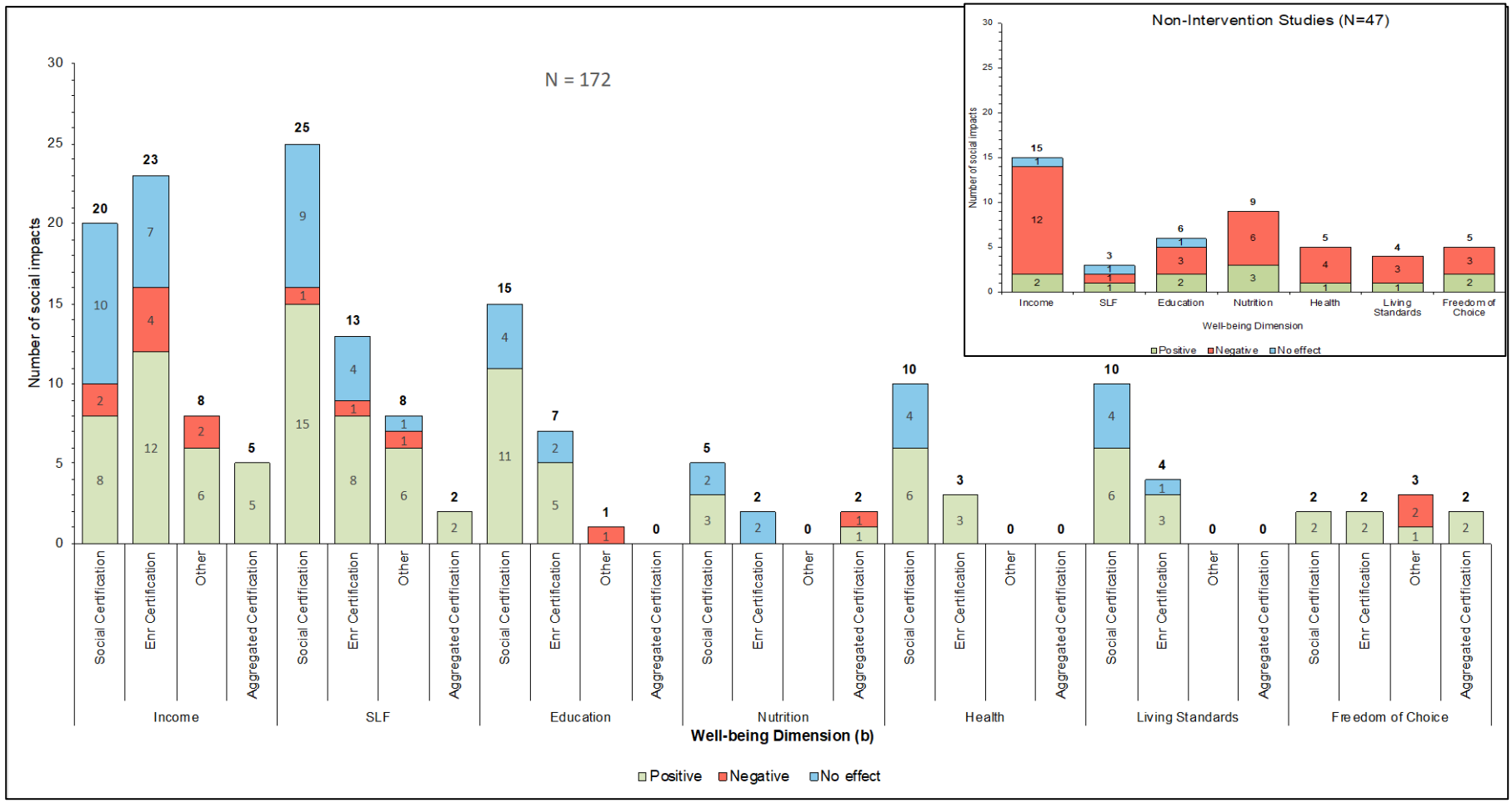


Figure 8: Frequencies and directions of impacts disaggregated by dimension.

Note: the figure only includes dimensions for which there were more than 10 counts of data and policy intervention for all the sample (a) and for studies which use a control group to the measure the direction of social impacts, note that the non-intervention figure is not derived from control group research. (b).

3.4.3 Recorded impacts of non-intervention studies

Social impact directions are commonly negative, comprising 68% of counts compared to 26% positive. This is particularly true for income (80%), health (80%), nutrition (67%) and living standards (75%) (**Figure 8**b).

Income. Regarding income, academic studies reference poor income derived from coffee production under poor market prices [26–29], which was often insufficient to cover production costs [27] e.g. labour, pesticides, fertilizer etc. In Tanzania, Mexico and Peru, coffee farmers operated at a loss in terms of their net coffee income [30]. Coffee often generated the smallest income returns in studies comparing coffee with crops, such as black pepper [31], cocoa [32] banana and vegetable [33]. However, market demand for these other crops was lower than coffee and therefore farmers cannot sell higher volumes.

Coffee returns did improve when intercropped with other crops. This was because coffee's low start-up production costs, through greater usage of organic farming methods, but low economic returns relative to black pepper were well balanced with black pepper's high economic returns [31].

Health. Associated with poor coffee income, coffee farmers struggled to fund access to healthcare [34]. Linked with working conditions in coffee fields and plantations, adverse health impacts, such as respiratory issues, were reported from the unsafe application of chemical and the processes involved in mechanically processing coffee cherries [35,36]. In Uganda, dark and moist conditions created under coffee plantations attracted mosquitos, which was perceived to increase malaria amongst those working in fields [26].

Nutrition. The lower income associated with coffee farming compared to other cash crops was correlated with greater food insecurity [37]. In Vietnam, households primarily growing coffee instead of more diverse food crops also experienced greater food insecurity [38]. Coffee farmers tend to access their food through purchases, but the latter finding suggests that their coffee income is insufficient to access food compared to cultivating food crops. Qualitative research uncovered that poor coffee income meant that households had to survive on the little food crops they grew, such as banana [27]. Others documented that child's nutrition was poor because parents spent all day working in coffee plantations leaving little time to properly prepare household meals [39].

Living Standards. Similar pathways of poor coffee income negatively impacted household's ability to acquire basic goods [34], such as clothing [27]. On coffee plantations, described housing conditions for working families were poor, where large families were limited to a single room [40].

Positive impacts. Some positive impacts are recorded for nutrition (n=3), freedom of choice (n=2), income (n=2) and education (n=2) (**Figure 8a**). Coffee market prices are highly volatile, and when coffee prices were high coffee production was actually linked to reductions in rural poverty and increased consumption per capita [41]. Coffee is also non-seasonal, which can supply stable income and employment [42]. This enabled households in India and Ethiopia to access food year round, which lowered durations of food shortages experienced and maintained a decent number of daily meals [42,43]. Such income stability also funded and benefited children's education by paying schooling costs [39].

3.4.4 Recorded impacts of policy intervention studies

The following interpretations concern **Figure 8**b's trends.

Social Certification. Most social impacts are recorded under social coffee certification (n=87), which encompass predominantly positive impacts. The four dimensions reflecting the most common positive impacts are SLF-asset (n=15), education (n=11), income (n=8) and health (n=6).

SLF-assets. The positive impacts on SLF-assets were mainly driven by the actions of certified producer organisations, which provided a pathway down the value chain to operationalise various social certification principles. For example, certified cooperatives increased access to credit and savings for their members, particularly under 4C, Café Practices and Fair-Trade certification [44–49]. Fair-trade certified cooperatives, for instance, provide pre-financing services to support producers with the cost of coffee production [49]. Regarding social capital, C4 and Fair-Trade certification schemes encouraged social networking and meetings amongst its members, which strengthened community ties and fostered exchanges of knowledge and ideas [46,50]. Equipment, such as water pumps, processing equipment and pruning equipment for producing and processing coffee beans were supplied to members of certified cooperatives resulting in increased access to physical capital [45,46,51]. Regarding human capital, certified cooperatives members exhibited greater farming skills and knowledge due to agricultural training provided to them from certified producer organisations, such as Fair-Trade cooperatives [51]. Such training often targeted improving the efficiency and sustainability of coffee farming practices e.g. reducing usages of agrochemicals.

Income. This comparison of effects of social certification on income should be interpreted with caution. This is because studies focus on singular or different combinations of indicators, such as farm gate pricing, coffee income, other crop income and production costs. Therefore, it is complicated to exactly ascertain the contribution of social coffee certifications interventions to individual and household income and coffee profitability, particularly without consideration to how coffee income influences overall income. Income from coffee may be negligible to income from other crops and sources, from which expanding coffee production may divert resources.

Control group studies reporting positive impacts on income predominantly assessed income quantitatively and comparatively [48,49,52,53], but yield little insight into the pathways linking social certification to impacts on income. Based on insight from more descriptive studies, income gains may be accredited to higher prices paid for certified coffee [54,55], the Fair-trade premium and minimal pricing [18] and increased coffee production rates [56]. The latter could be down to certification schemes education on how to more efficiently produce, handle and store coffee beans [54,57].

[46] links their results to the income benefits from the Fair-trade coffee premium and higher prices paid for Fair-Trade coffee compared to conventional coffee. However, this study did not factor in production costs. A study in India, which considered production costs, net income per crop (other crops as well as coffee) and pricing, reported significant increases in both net coffee income and overall household income for Fair-Trade farmers [51]. However, it was apparent from the literature that payments through certifications, like Fair-trade, come in instalments (not upfront) months apart whilst coffee is sold on international markets, whilst conventional coffee farmers received payments from buyers upfront [46]. This means that although overall certified farmers income is positively impacted, farmers must wait for payments which can be challenging for meeting immediate household needs. These cases

underscore the point that the effects of social certification intervention on income are not clear cut.

Education. Households members of social certifications, including Fair-trade and UTZ, had greater numbers of children in school [44] and their children stayed in school longer [45,58]. The evidence suggests that education benefits can be influenced by social certification interventions that increase income. For example, increased coffee income found under Fair-Trade membership was statistically and positively associated with increased education [52]. Fair-Trade certified households report being better able to afford school supplies enabling children to stay in education longer [51]. Studies assessing expenditure on education found higher expenditures for households engaged in Fair-Trade [17] and Café Practices [48] certification. Other mechanisms positively influencing education described in the grey literature convey how Fair-Trade community premiums are invested in school infrastructure and school supplies for children, which attracted teachers and enabled better access to schooling for children [59].

Health. Social certification was correlated with improved health through improved access to healthcare. [58,60] document higher proportions of certified households than non-certified households as the former were able to access to affordable healthcare when needed. In [60], FT cooperatives assist their members in signing up for medical care, whereas non-Fair-Trade households cited a lack of knowledge about registering. UTZ schemes also invested in community healthcare infrastructure that was perceived to increase healthcare access [61]. Whilst it is difficult to attribute health improvements to social certification, these cases portray a positive and influencing role of said schemes on health. Lastly, a quantitative regional study by [52] found a significant indirect effects from increased income under Fair-trade certification and ability to seek healthcare when ill, which indicates income related pathways.

Negative impacts and no effects. Just 3 negative impacts were recorded, belonging to SLF-assets (n=1) and income (n=2). However, **Figure 8**b shows that social certifications more commonly had no effect on income (n=10) than a positive effect (n=8). Various pathways were documented for this.

Firstly, despite receiving higher coffee prices under Fair-Trade and 4C such financial gains are offset by increased production costs, such as paying higher wages to labourers required under certification [50,53,62]. In Peru, higher labour costs were linked with lower farm productivity, which limited coffee yields and subsequent income gains [47]. This study [35] recognised that during data collection conventional coffee market prices were high. The authors suggest that this mainly benefitted the control group and may have contributed to the ‘no effect’ result.

Secondly, some control group farmers derived more of their income from other higher value crops, whereas certified farmers mainly farmed and sold coffee [63]. In Kenya, conventional farmers were able to increase their income more than Fair-Trade coffee farmers through selling alternative higher value crops when coffee market prices were low [63]. Farmers in control groups also did not have deductions made from payments for fees and using inputs like fertilizer, which was reported for some certified cooperatives [58].

Lastly, [64] attributes no effects to Fair-Trade farmers being unable to sell most their coffee because in certification coffee markets production often exceeds demand. Consequently, certified farmers sell their remaining higher value coffee, often produced at higher costs, to private buyers at lower prices.

Environmental Certification. Proportionally, environmental certification generates more positive impacts (61% compared to 59%). This is true for income and other dimensions including SLF-assets (62%), education (71%) and living standards (75%).

Income. More positive impacts are recorded for environmental than social certification for income. This is interesting because social certifications like Fair-Trade target enhancing producer income in value chains, whereas environmental certification, e.g. Rainforest Alliance, tend to target coffee farming practices and conservation.

The mechanisms correlating environmental coffee certification and enhanced income mirror those reported for social certification. Studies found that rainforest alliance and organic coffee fetch higher prices relative to control groups improving overall income [49,62,65]. A key study in Ethiopia compared the effects of various social and environmental certification interventions on producer income and documented that coffee prices were higher for environmental certified coffee, such as Rainforest Alliance, than for social certified coffee (e.g. Fair-Trade) due to a shorter and more exclusive supply chain [62]. The study also documented greater income losses endured only by Fair-Trade farmers owing to higher labour costs, which is congruent with other studies citing environmental certifications comparatively lower coffee production costs [66]. Such factors may help in explaining the greater counts of positive income impacts for environmental compared to social certification in **Figure 8**b. Labour costs are, however, not always low under organic coffee certification because more labour can be needed for practising organic farming [67,68].

Some evidence indicates that environmental certification can have no or an adverse effect on income due to the negative effects on coffee yields [66,69,70]. Organic certification, for instance, encourages organic farming and discourages agrochemicals, which can result in lower coffee yields than control groups using agrochemicals. Therefore, despite often receiving higher coffee prices, coffee yields can be lower, which limits and adversely impacts overall income. [66] also highlight the potential broader negative impacts on income under organic certification. They stress that that under organic certification the entire farm must be organic. This means other crops must be produced organically but without the same organic price premium.

SLF-assets. The positive effects on SLF-assets from environmental certification schemes follow similar pathways to social certifications. Rainforest Alliance schemes, for example, increased access to farming inputs for certified members (physical capital), credit (financial capital) and contributed to capacity building through enhancing producer's farming skills and knowledge (human capital) [53]. Regarding social capital, Rainforest Alliance certification schemes were associated with enhancing producers' social networks and ties because their members participated more often in community and organisation meetings than the control group producers [48]. Meeting others and the resulting reinforcement of community and organisation social ties, as well as better access to credit and learning new skills and knowledge, were reasons given why coffee producers decided to remain with Rainforest Alliance schemes [71].

However, for organic certified cooperatives members described no perceived differences in their social networks and cohesion following membership [15]. Another study revealed that producers members of organic certification schemes owned less livelihood assets than control groups and members of other certification schemes e.g. Rainforest Alliance, Café Practices and Fair-Trade [48].

Living Standards. Environmental certification membership was quantitatively associated with improving producer's housing and sanitation [45]. [48] also reports greater expenditure on

housing for members of environmental coffee certification schemes. An in-depth study in Uganda by [72] which considered various social and environmental certification schemes found that the reported increases in expenditure on living standards were actually mainly driven by Fair-Trade certification, and not environmental certification, due to Fair-Trades superior coffee prices. It can be inferred from these studies that effects on living standards from certification are income related.

Education. The ways in which environmental certification affects education appear consistent with social certification. Children of environmental certified households usually attain more years of schooling (up to 2 years more) than control group children [45,71,73], and households exhibit higher expenditure on education [48]. Few exceptions where school attendance and expenditure did not differ were reported [17,49].

Other policy interventions. In total, 20 social impacts are recorded under other policy interventions, with 65% of these positive impacts and 30% negative. Most positive impacts are recorded for income (n=6) and SLF-assets (n=6), and the fewer reports of negative impacts are found for freedom of choice (n=2), income (n=2) and SLF-assets (n=2). Other policy interventions are disaggregated into their respective approaches, e.g. value chain approach, coffee cooperative, in the following narrative synthesis.

Income. The value chain approaches studied positively impacted income. For instance, Café Justo's (grower owned Mexican coffee cooperative) vertical integration captures the value added in coffee value chains by only using the cooperative's factories and roasting facilities, which benefited producer incomes [46]. This was believed to be because they were able to return the value back to producers through improved coffee prices.

Producer organisations, such as cooperatives, generally positively impacted income. In Rwanda, cooperative membership was associated with 10.1% more income [74]. The authors felt that this improvement was linked to the cooperatives training on best practices that cut production costs, increased coffee bean quality (increasing coffee prices) and increased productivity, as well as the sharing of inputs e.g. pesticides at reduced costs. Other studies highlighted better coffee price stabilisation offered through cooperatives [75], which may relate to cooperatives having greater collective power in price bargaining than individual producers [76]. Some negative impacts are recorded under cooperatives (n=2). For example, despite intervention by coffee cooperatives in Nicaragua coffee farmers experienced sharp decline in income ($1.10 down to $0.40 per pound of coffee) following the 1999 coffee market crisis [73].

Other interventions of note positively effecting income were government migration related interventions [77] and shaded coffee agroforestry systems [78]. Regarding the latter, both high-input open sun and low-input shaded coffee systems (agroforestry) compared in the study created profit for producers, however the returns from agroforestry coffee were higher due to lower production costs.

SLF-assets. Only one negative impact was recorded for SLF-assets, which was from reduced access to credit and loans under a value chain approach (mechanism not discussed) [46]. The descriptive studies indicated that local value chain approaches, such as 'relationship coffee' where roasters directly engage with producers without a third party, can succumb to elite capture where cooperatives and village figures mainly benefit [79]. Elite capture is a potential risk when regulation from larger-scale interventions, such as Fair-Trade and Rainforest Alliance, are absent.

The remaining positive impacts were found for cooperatives. As producer organisations, cooperatives provide training, education, services, such as coffee bean washing stations,

farming equipment, inputs and access to credit and loans for members to assist with coffee production and build capacity, which simultaneously benefits members' human, physical, financial livelihood capitals [74,75,80–82]. Such mutual benefits foster trust, social reciprocity and commitment in communities and producer organisations (social capital) [81].

Freedom of Choice. Cooperatives reportedly increased women's empowerment and control over household resources by encouraging their involvement in coffee production [82]. In Mexico, cooperatives marketed their coffee as 'women's coffee', with women receiving and controlling the ensuing income [25]. This increased their decision-making power in households, whilst premiums were invested women's development projects. A similar outcome is recorded in Colombia, where the NGO 'the national federation of coffee growers' promoted women's coffee in response to the 2008/09 coffee market crisis [83].

The negative impacts pertain to cooperatives marginalising women. Women reportedly felt discouraged by cooperative members to pursue community leadership roles and attend community meetings [80]. Women also citied negative effects on achieving their personal aspirations because their income needed to do so from selling coffee through cooperative was said to be declining [73].

Aggregated Certification. In total, 11 social impacts are recorded under aggregated certification interventions, which are 91% positive and 9% negative. Positive impacts are documented for income (n=5), SLF-assets (n=2), nutrition (n=1) and freedom of choice (n=2) dimensions. Just one negative impact is recorded (nutrition). As different certification interventions are aggregated in the studies it is complex to disentangle their effects for a clear disaggregated description of the aforesaid impacts. The effects of these certification interventions on well-being dimensions have also already been sufficiently explored. Therefore, a narrative synthesis is not presented for aggregated certification.

Summary. Table 5 summarises the effects of policy interventions in relation to the well-being dimensions studied, as well as the wider socio-economic impacts that are outlined in section 3.8.2. Under policy interventions coffee trade leads to mostly positive social impacts. Without interventions the impacts of coffee trade are mainly negative. This denotes that, overall, policy interventions are required to enable positive social impacts through coffee trade.

Observably, different policy interventions perform differently in relation to different social impacts. Social certification is the only intervention deemed to not overall positively impact income. However, it is the only intervention which was deemed to overall positively impact nutrition, which environmental certification had no effect and aggregated certification had mixed effects. Overall, individual coffee certification schemes perform better than aggregated certification and other policy interventions, which actually generate negative impacts for education (other policy interventions), freedom of choice (other policy interventions) and socio-demographic impacts (aggregated certification). Scant data for certain interventions limits the comparison somewhat of the effects of policy across all social impact groups.

Table 5: the effects of different interventions on all impacts.

	No Intervention	Social certification	Environmental certification	Other policy intervention	Aggregated certification
Income	--	Most measured outcomes found no effect	+	+	++
Health	--	+	++	n/a	n/a
Nutrition	-	+	All impacts were 'no effects'	n/a	Equally mixed +ve and -ve outcomes
Education	Mixed	+	+	--	n/a
Living Standards	-	+	+	n/a	n/a
Freedom of Choice	-	++	++	-	++
SLF	Mixed	+	+	+	++
Development of public goods	--	+	n/a	++	++
Gender rights and discrimination	+	+	n/a	All impacts were 'no effects'	Mixed
Working Conditions	-	+	++	n/a	++
Socio-demographic impacts	Mixed	n/a	n/a	++	--

The effects of each intervention were scored in accordance with the ranking criteria: ++ = predominantly positive effects, + = mostly positive effects, - = mostly negative effects and – = predominantly negative effects.

3.4.5 Coffee production and the Sustainable Development Goals

As a sub question of RQ3, we analysed the impact of coffee trade on socially oriented SDGs. Based on the SDG matching we produced figures displaying the frequency of SDGs in the study sample (**Figure 9**), their direction of change associated with coffee production before disaggregating this by policy intervention (**Figure 10**).

Overview. Studies mostly considered SDGs 1 (n=94), which aims to eradicate poverty in all its forms everywhere, 2 (n=43), which aims to end hunger, achieve food security and improved nutrition and promote sustainable agriculture, and 4 (n=37), which aims to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all quality, respectively (**Figure 9**). SDGs 9 (n=4), which aims to build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation, 11 (n=4), which seeks to mak cities and human settlements inclusive, safe, resilient and sustainable, 7 (n=1), which aims to ensure access to affordable, reliable, sustainable and modern energy for all, and 16 (n=1), which seeks to promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels, were the least common. SDGs 8 (n=16), promoting sustained,

inclusive and sustainable economic growth, full and productive employment and decent work for all, 3 (n=13), ensuring healthy lives and promote well-being for all at all ages, 10 (n=8), reduce inequality within and among countries, and 5 (n=8), achieve gender equality and empower all women and girsl, all received moderate attention in the study sample.

There was mainly positive progress towards the SDGs (59.8%) compared to negative (28.4%) and no effects (11.8%). The greatest counts of positive SDG progress are recorded for SDG 1 (n=46), 4 (n=27), 2 (n=26) and 8 (n=14). Proportionately, SDGs 7 (100%), 9 (100%), 11 (100%) and 8 (87.5%) reflect the greatest positive impacts, but the number of observations is low. Negative effects are most common in SDG 1 (n=34), 2 (n=13) and 4 (n=6). Proportionately, SDG 16 (100%), 5 (37.5%), 10 (37.5%) and 1 (36.2%) have the most negative impacts. However, again SDGs 16, 5 and 10 have few data counts.

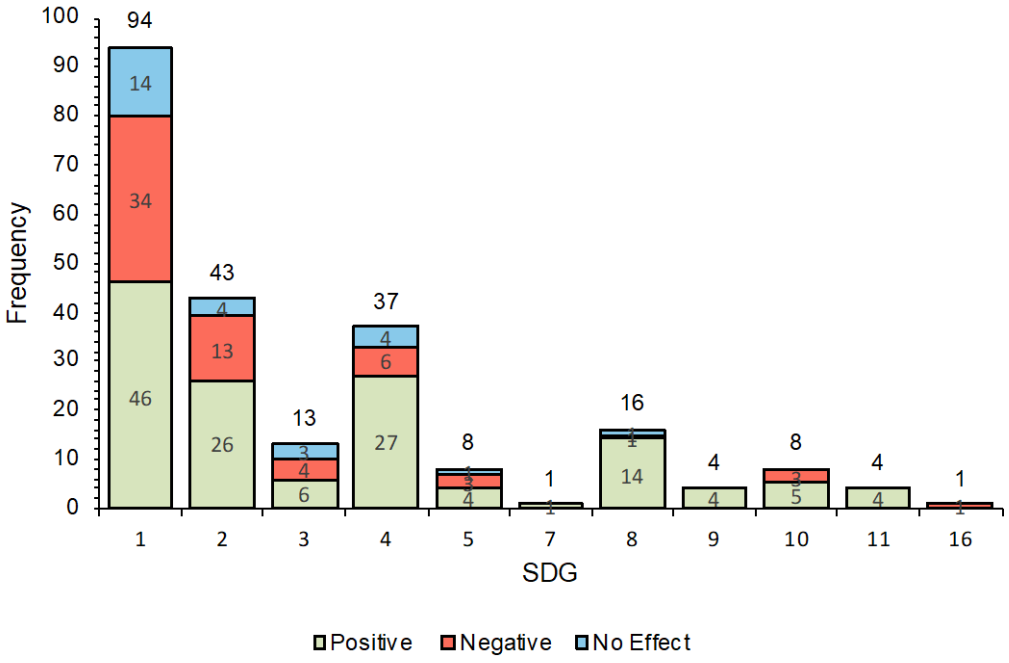


Figure 9: Frequency of SDGs and their respective direction

Note: SDG1 = no poverty, 2 = zero hunger, 3 = good health and well-being, 4 = quality education, 5 = gender equality, 7 = affordable and clean energy, 8 = decent work and economic growth, 9 = industry, innovation and infrastructure, 10 = reduced inequality, 11 = sustainable cities and communities and 16 = peace and justice strong institutions.

Policy Interventions. Most studies examining the effects of policy interventions focus on SDGs 1 (n= 60) and 4 (n= 25). In common with well-being impacts, the majority of **Figure 9**'s negative impacts on SDGs pertained to non-intervention studies (n=30) (**Figure 10**). There is a relatively clear positive effect of policy interventions, particularly for certification, on SDGs (especially SDGs 1 and 4). Certification interventions only present negative impacts, in low numbers, for SDGs 1 and 8, but the majority of observed impacts (64.4%) are positive compared to the non-intervention group (23.3% positive). Other policy interventions also reduce the negative, and increase the positive, impacts associated with SDG 1. Scant data limits comparison to the other SDGs. In summary, these results suggest that coffee certification can be an effective policy intervention to foster progress to the SDGs listed.

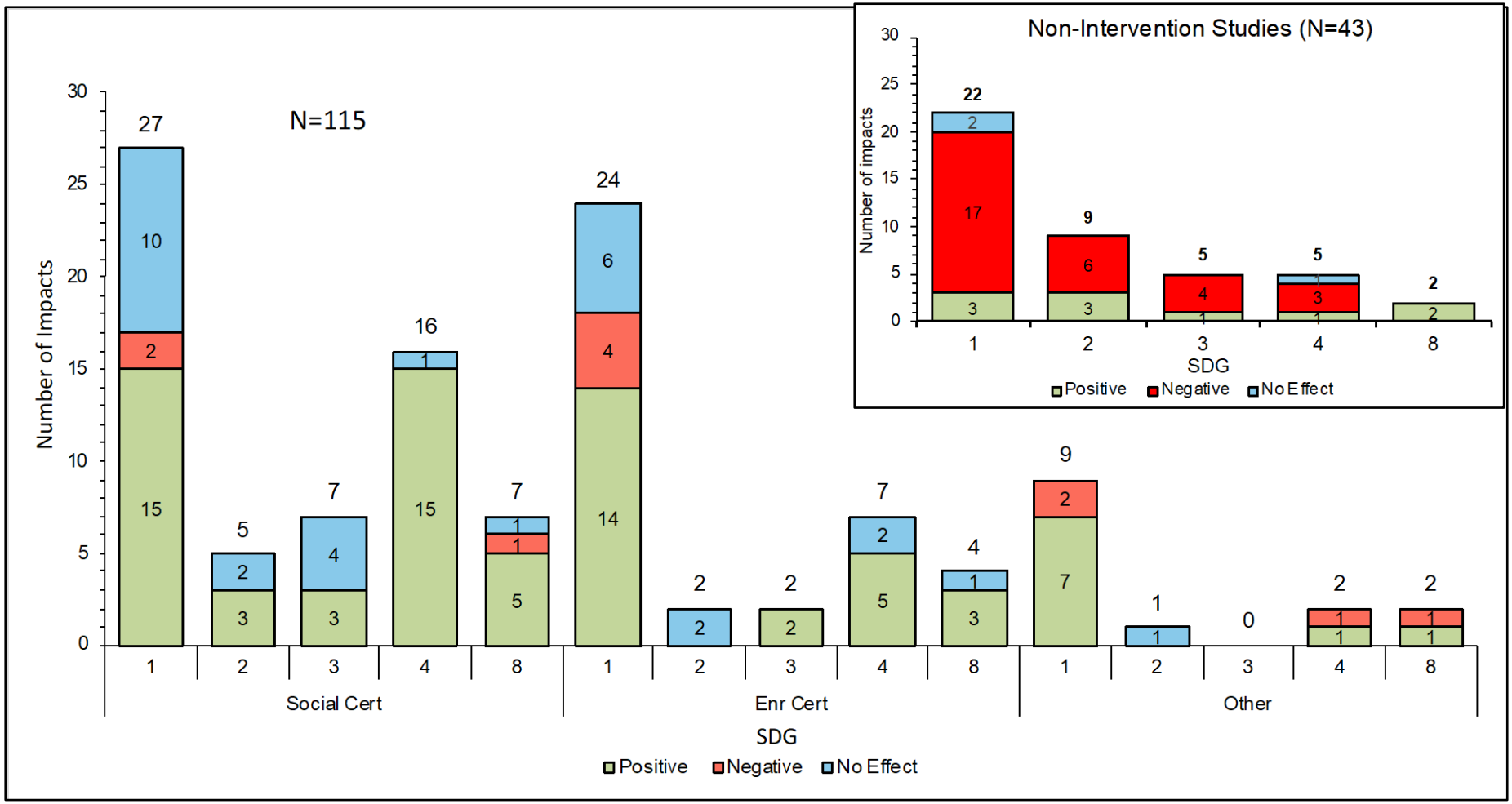


Figure 10: Frequency of SDG and their respective direction recorded under control groups disaggregated by intervention for SDGs with at least 10 data counts.

Note that the non-intervention data also presented are not derived from control group research

3.5 Drivers of well-being impacts

3.5.1 Overview of drivers – changes in the macro-level system

The drivers creating social impacts are explored and grouped into relevant categories that also broadly correspond to the multi-scale systems in the conceptual framework. These categories are social drivers, e.g. movements and changes in population [55], environmental, e.g. climate change impacting coffee production [84] institutional, e.g. changes in government policies, for instance, encouraging transitions from subsistence into commercial farming [85], market price, e.g. macro-markets influencing coffee price volatility [86], consumer demand, e.g. consumers awareness regarding the type of coffee purchased [68] and other.

In reality, drivers may not act alone. When studies mentioned multiple drivers, these were grouped accordingly. For example, climate and deforestation coinciding with coffee price volatility [87], and coffee pest and disease outbreaks and low coffee prices [37], were grouped into environmental-market drivers. Furthermore, to permit analysis across the drivers, and if there were reasonable grounds, some categories were combined to acquire a sufficient sample size. This happened for combined social-market for instance.

Coffee market prices mostly drove the frequency of social impacts in the selected sample (n=131), followed by consumer demand (n=84) and institutional drivers (n=52) (**Figure 11**). The combined drivers of institutional-market (n=15), environmental-market (n=13) and social-market (n=7) are less common. A count of 40 social impacts were not traceable to drivers in studies.

Regarding the direction of impacts, institutional drivers generate the most positive impacts proportionally (75%), followed by combined environment-market (69%), consumer demand (57%), combined institutional-market (53%) and coffee market prices (50%) (**Figure 11**). Concerning negative impacts, combined institutional-market drivers created the most (40%), followed by combined social-market (29%), combined environmental-market (23%) and coffee market price (21%). Combined social-market drivers had the highest proportion of ‘no effects’ (43%), followed by coffee market prices (29%) and consumer demand (27%).

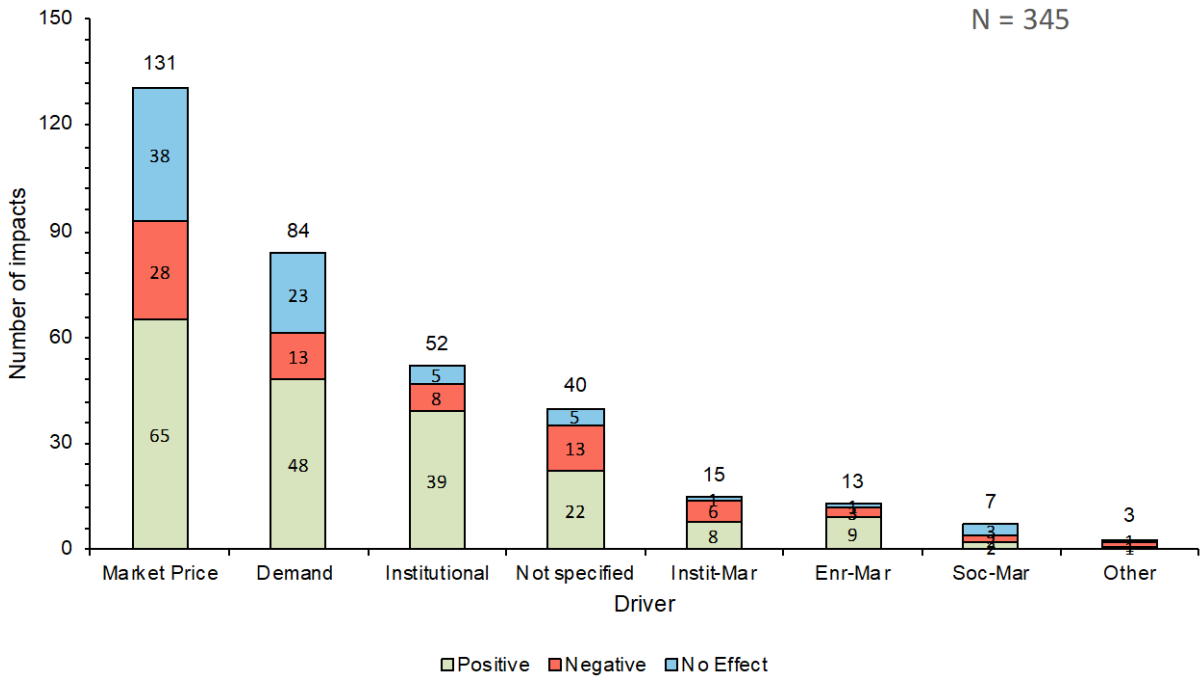


Figure 11: Frequencies of drivers of social impacts and their respective directions.

Instit-Mar =Combined institutional and market, Enr-Mar = environmental and market, Soc-Mar= Social and Market.

3.5.2 Responses

The majority of **Figure 11**'s drivers prompt responses in policy interventions (70%). Regarding drivers that prompted policy interventions, coffee market prices (n=113), consumer demand (n=82) and institutional (n=34) are the most common. However, 23 of the impacts for the institutional drivers pertain to a comprehensive study in Indonesia [45], which recorded a high number of individual impacts across multiple dimensions and certification interventions. Therefore, coffee market prices and consumer demand are the primary drivers prompting responses. Coffee certification interventions, such as Fair-Trade and Rainforest Alliance, were regularly employed in response to consumer demand for more ethically and socially and environmentally sustainably produced coffee [17,18,23,47,51,52,56,62,72,88–90]. Similarly, social certification, cooperative and value chain initiatives were implemented to protect producers from volatile and collapses in coffee markets [44,73,91–95].

3.5.3 Influence of policy interventions on impacts of drivers

Figure 12's policy intervention data is derived from the studies whereby a control group is used to measure the impact of the policy interventions. **Figure 12**b aggregates health, living standards, education and nutrition dimensions to increase the sample and permit comparison across the no intervention and policy intervention groups. These dimensions are commonly grouped in multi-dimensional poverty and well-being indexes for mid-low income countries [96–99], such as those producing coffee. Figures did not include the SLF dimension due to insufficient data in the no intervention group (n=2). Insufficient data for the remaining dimensions, as well as the aggregated certification group, restricted comparisons and are not presented. Comments are not made regarding outcomes of 'no effect', because the details are unknown about the control group's situation in studies.

Income. A trend can be inferred which suggests that policy interventions can transform the negative into positive impacts on income from drivers (**Figure 12**a). Interpretations should be

considered carefully due to a limited amount of data and cases without impacts recorded. Focusing on drivers of coffee market prices, as there are adequate data, policy interventions generally transform negative into positive impacts.

To indicate how certification enabled positive impacts on income the relevant studies conducted in Mexico are consulted to limit possible wider contextual influences. In non-intervention studies, as expected low coffee market prices were linked with negative impacts on Mexican coffee farmer's income [28]. In the studies examining certifications, one study found that increased coffee productivity, subsequently increasing producer's ability to sell more produce, rather than price stabilisation and minimum pricing increased producer's income irrespective of low coffee market prices [100]. This is consistent with another study in Uganda [101]. Other certification studies in Mexico found that the positive income impacts, despite low coffee market prices, were accredited to certified farmer's and cooperatives ability to access higher prices for Fair-Trade and organic coffee from certification markets [46,55]. These examples presented indicate that certification interventions that increased coffee productivity and prices enabled positive impacts on income under adverse conventional coffee markets.

'Other' policy interventions, regarding non-certified coffee cooperatives, appear to have adverse effects under market drivers because coffee farmers succumb to negative impacts on income. In the relevant study [73], cooperative members used to receive farming equipment and inputs, but this had stopped, and also did not receive the same coffee selling pricing as certified cooperatives. This suggests that a possible inability to increase coffee productivity and pricing benefits could be associated with negative income outcomes.

Regarding institutional drivers, **Figure 12**a suggests that 'other' policy interventions transform negative into positive impacts. However, closer scrutiny of these studies showed that changes in government policy (the driver) led into government interventions. These government interventions focused on increasing the productivity of the coffee sector [102], pricing and price stabilisation by influencing market regulation, as well as encouraging the expansions of cooperatives that are intended to increase producers bargaining power [75,77]. The positive income outcomes therefore could be again linked with coffee pricing and productivity.

Multi-dimensional Well-Being. Concerning multi-dimensional well-being (**Figure 12**b), a similar trend inferring that certification policy interventions change negative into positive impacts under various drivers is shown. This is mostly evident for coffee market price and institutional drivers. Some cases for each dimension are drawn out from the sample of studies.

Nutrition. Concerning market drivers, a non-intervention study found that coffee farmer's nutrition was negatively affected by low prices for selling their coffee, which hindered their ability to purchase food [27]. In comparison, a different study found that Fair-Trade and UTZ certification was associated with increased expenditure on food despite low coffee market prices [63]. These findings may suggest that certification may benefitted household financially which enable increased spending on food. However, this same study actually found negative impacts on certified producer's income, which could imply that the higher food expenditure could relate to household's requirement to buy more food because less food crops are cultivated. The effect of certification on nutrition under market drivers is therefore complex to disentangle based on current evidence in the literature.

The same holds for current evidence regarding institutional drivers. In Ethiopia, increases in commercial agriculture more generally (not specifically coffee) encouraged by national

government was found to adversely affect smallholder's nutrition because households cultivating coffee had greater food insecurity than other households cultivating more diverse food crops [85]. Whereas in Vietnam, government efforts to increase coffee production resulted in lesser food insecurity for smallholder coffee farmers who belonged to certification [58]. The mechanism explaining these differences in nutrition outcomes was not discernible from the data extracted. It was likely not income-related because no effects on income were recorded under certification.

Health. Regarding health, one study showed that under low and volatile coffee market prices there were high percentages of farmers in Mexico (80% of a large study sample) and Guatemala (89.3%) who couldn't afford medical expenses [34]. In comparison, another study showed that smallholders certified by FT-organic, Café Practices or Rainforest Alliance had higher expenditure on healthcare, as well as greater income, despite poor coffee market prices [48]. These examples suggest that the protection of coffee farmers income against market drivers also have knock-on positive effects on access to healthcare.

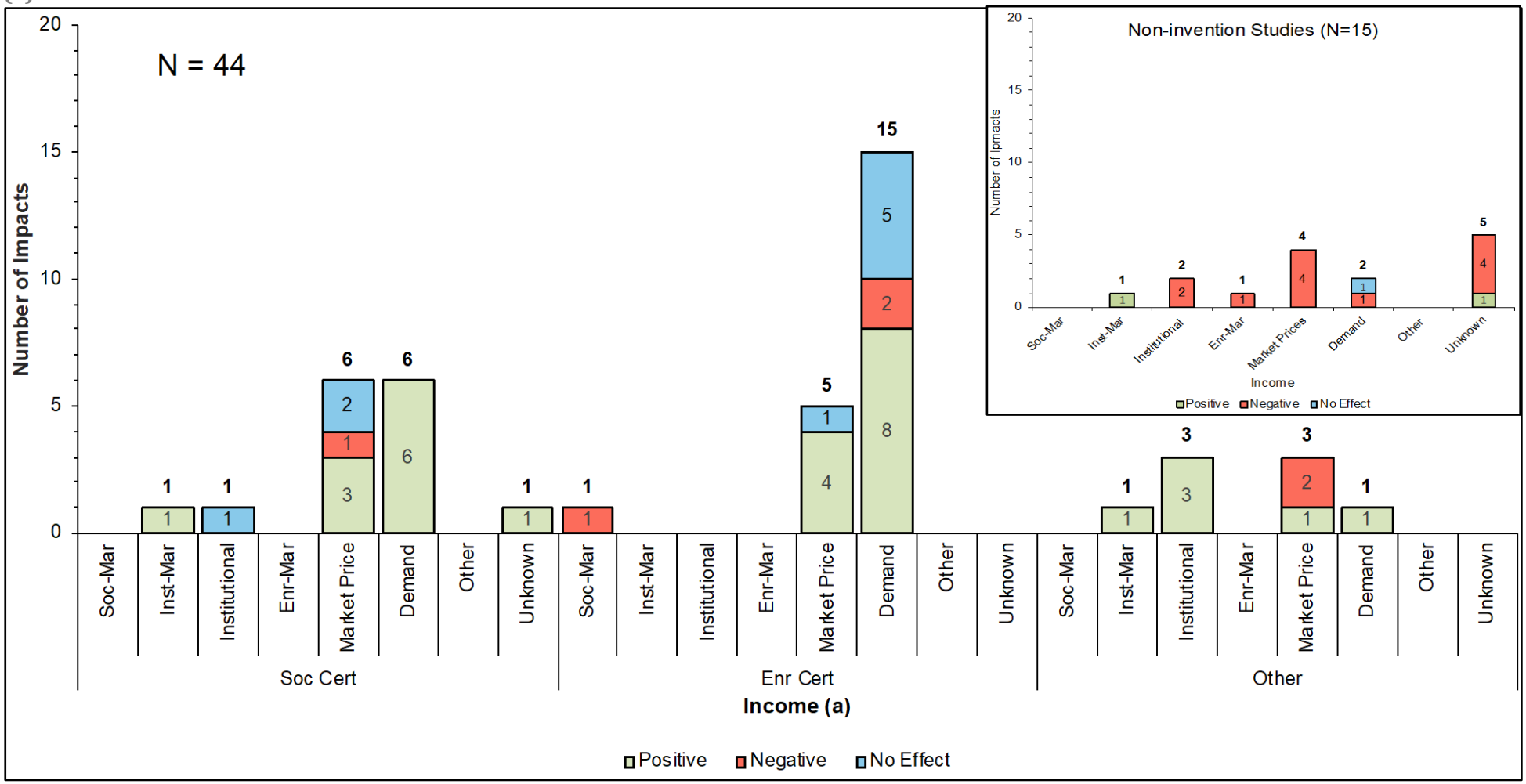
No explanation for the positive health impacts under certification and negative health impacts under no-interventions studies regarding institutional drivers could be discerned from the data.

Education. Regarding education, favourable coffee market prices actually presented a scenario whereby education was negatively affected. This was because farmers would increase coffee production requiring assistant for their children at the expense of schooling [103], which creates a trade-off where increased pricing negatively influences education by creating incentives for child labour. In another study, market volatility and low pricing creating a 'coffee crisis' negatively impacted income and subsequently smallholder's ability to afford school fees [34]. Studies that found positive effects on education from certification interventions under market drivers suggests the mechanisms are again income related. In Nicaragua, Fair-Trade provided school scholarships for its members which benefitted education [44]. This was despite very low recorded net coffee income ($0.38 per day) related to market drivers at the time of study. [48]'s study, which found that certification increased farmer's income despite poor coffee market prices, revealed an association between certification and increased expenditure on education.

Again, there were no potential links based on the data extracted which could explain how certification reduces the negative impacts to education under institutional drivers.

Living standards. Comparison regarding the effect of certification on reducing the negative, and enhancing the positive, impacts on living standards from low and volatile coffee prices were limited to three studies in the sample. [27,34] both found reduced ability to afford household basic goods i.e., clothing, in their studies without policy intervention. In contrast, [48] report increased expenditure on housing in their certification study group, which also experienced increased household income. These certifications [48] assessed (Fair-trade, Rainforest Alliance and Café practices) were recognised to supply premiums based on coffee quality and minimum prices (only Fair-Trade). Such premiums may have protected smallholder's income and enabled them to spend money on their housing despite poor coffee market conditions.

(a)


N = 44
Number of Impacts
Soc-Mar
Inst-Mar
Institutional
Enr-Mar
Market Price
Demand
Other
Unknown
Soc Cert
Enr Cert
Other
Income (a)
Positive
Negative
No Effect
Non-invention Studies (N=15)
Number of Ipmacts
Income

(b)

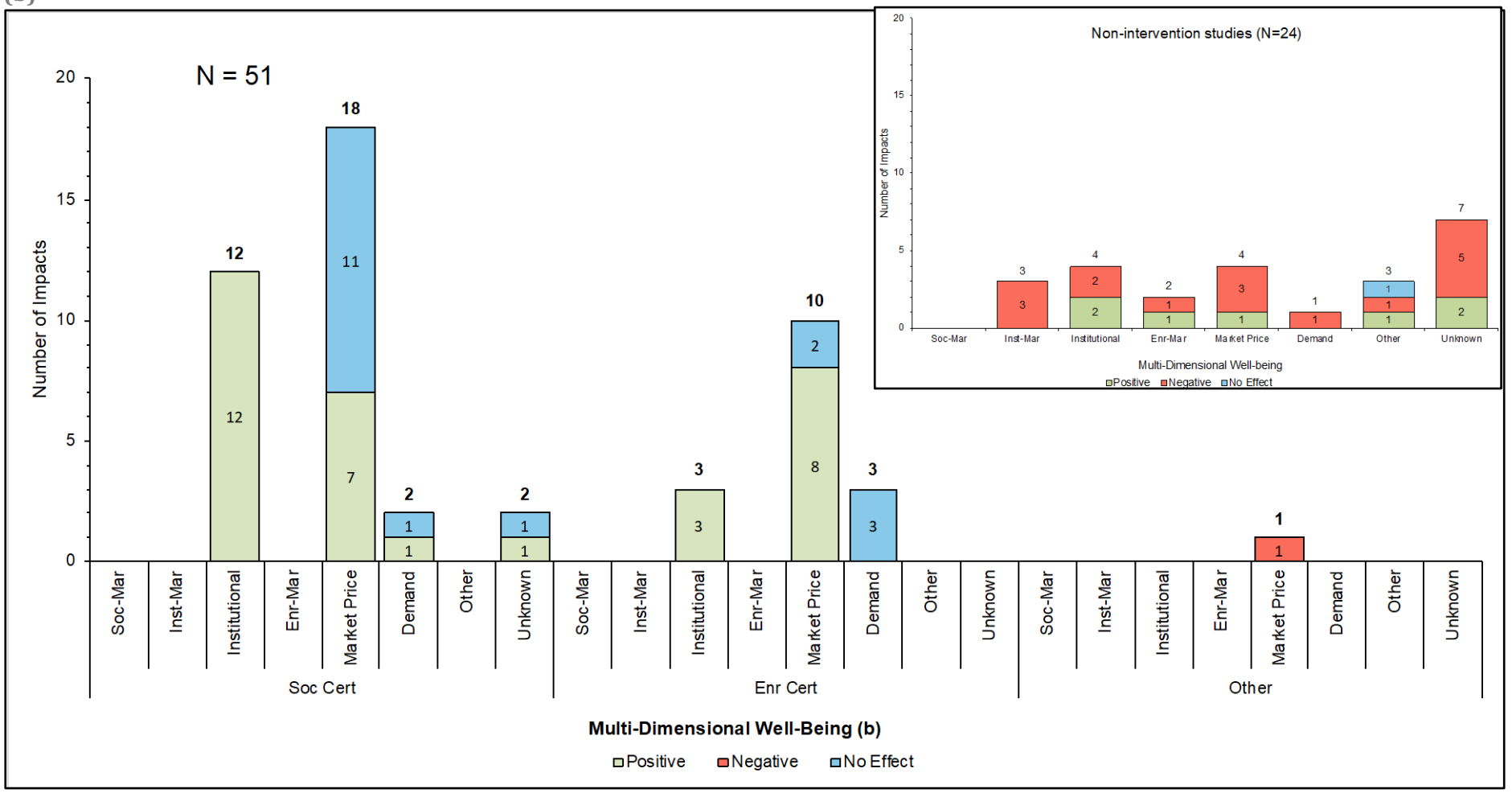


Figure 12: Number and directions of social impacts by intervention type and no intervention for income (a) and multi-dimensional well-being (b).

Note that the non-intervention study data are not derived through control group research.

3.6 Evidence of differences across groups

To address RQ5, we summarise the studies that assessed determinants of certification membership, which mediates ability of coffee farmers to benefit from certification schemes and investigated differences in social impacts across categories of stakeholder groups.

3.6.1 Determinants of certification membership

A total of 11 studies, 8 using quantitative methods and 3 using qualitative methods, investigating policy interventions also explored the determinants of certification membership. This is important because it highlights how positive impacts gained through coffee certification do not lead to benefits for some producers depending on their socio-demographics. **Table 6** lists the farmer's socio-demographics found to reduce their likelihood of gaining certification.

Looking at **Table 6**, this reveals that farmers with less landholdings, less education and less access to assets are less likely to become certification members. These are characteristics of the poorest and most marginalised coffee producers, yet trade policy interventions, such as Fair-Trade certification, seek to target and benefit the poorest most marginalised producers. The findings of the 11 studies suggest that such policy intervention benefits, such as coffee price premiums and minimum prices, may not be reaching the intended poorest coffee producers who are also more vulnerable to drivers such as volatile coffee market.

Table 6: List of socio-demographics negatively affecting the likelihood of certification

Determinant	Reference
Older farmers	[87]
Less educated	[24,56,65,75,87]
Technically inefficient	[87]
Low income	[26]
Low access to assets e.g. technology, equipment, training	[24,56,72,82]
Small landholdings	[24,81,82]
Large landholdings	[65]
Poor road access	[72]
High distance to cooperatives from households	[75]
Less socially connected	[75]
Female farmers (with poor ownership of resources e.g. land	[82]
Male farmers	[101]

3.6.2 Differences across value chain actors

Studies predominantly focused on smallholder farmers (n=337) (**Figure 13**). Other value chain actors investigated were farm workers (n=21) and cooperatives (n=18). Some impacts were recorded for farmers (n=4) and few studies focused on rural residents and businesses (n=2), and none considered impacts on indigenous communities, government staff and NGO staff.

Little evidence regarding the social impacts of coffee production across stakeholder groups exists for comparisons across value chain actors. Consequently, it is uncertain how profits and benefits are distributed across the coffee value chain. This means that current literature

is unable to robustly reveal whether interventions, such as coffee certification, mainly benefit the intended value chain actors (producers receiving the fewest profits) and not higher up actors, such as cooperatives or roasters, because evidence highlighting (dis)benefits to other actors is scarce. Indeed, Figure 13 depicts that smallholder coffee farmers mostly experience positive impacts, but by how much and how frequently relative to other value chain actors is uncertain based on present evidence.

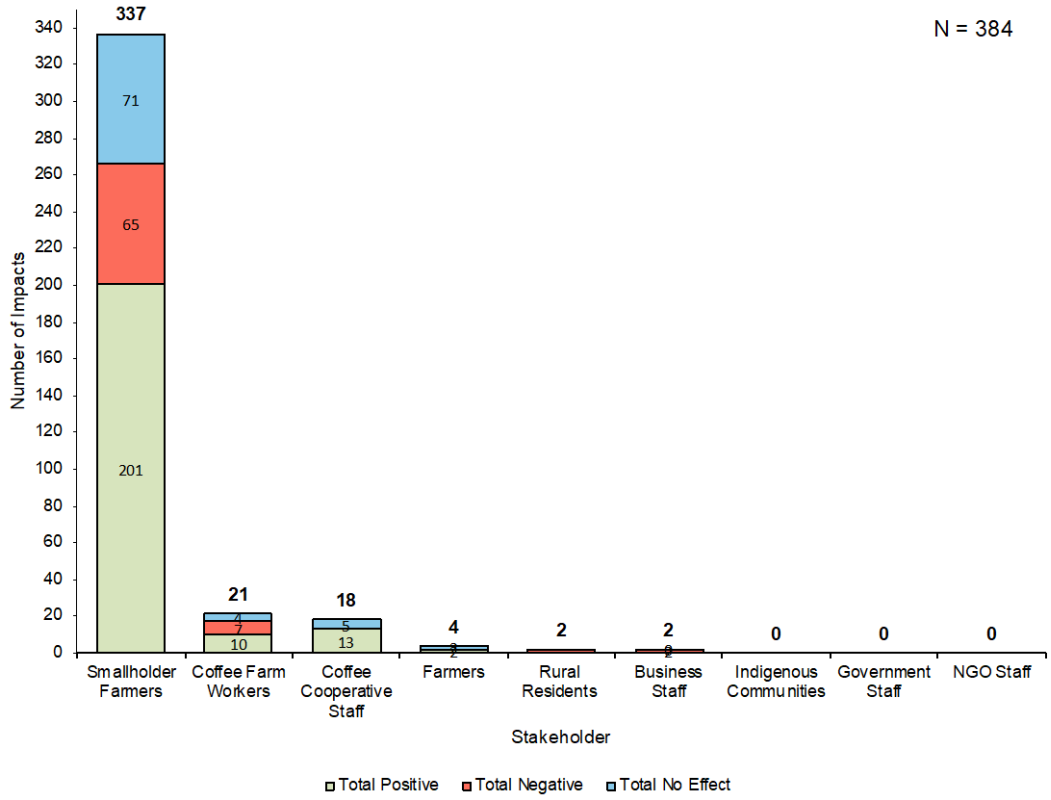


Figure 13: Frequencies of social impacts and directions per stakeholder group.

Note: smallholder farmers include smallholders cultivating coffee, coffee and other crops and just other crops. Farmers includes unspecified farms cultivating coffee, coffee and other crops and just other crops.

3.6.3 Differences across smallholder coffee farmers

The number of impacts to smallholder coffee farmers which are disaggregated is greater (n=268) than for impacts which are not (n=73). Following by policy intervention (n=174), disaggregation by gender (n=37), income level (n=19), producer organisation (n=16) and country/location (n=15) are the next most common respectively. Disaggregation by farming system (n=4) and ethnicity (n=3) are the least common respectively.

Gender. Because other sections focus on the impacts of policy interventions focus here is on disaggregation by gender as the next most common. Compared to smallholder coffee farmers which studies do not disaggregate, and which do not examine a policy intervention, coffee farmers that are disaggregated by gender i.e. those who are women experience more negative and less positive impacts from coffee production (Figure 14). A qualitative-based study, for example, uncovered that despite women undertaking most physical farm work the men sold the coffee and kept most the income [26]. This unequal distribution of income has negative knock-on effects on women's access to and control over resources (freedom of choice) and created social tensions in households leading to beatings of women, negatively

impacting their feelings of safety as household family relationships. Women smallholder coffee farmers' poorer access to and control over resources compared to men was frequently mentioned. Another study detailed that women coffee farmers would own significantly less assets, such as land and livestock, than men, and would struggled to secure any community leadership roles or partake in village meetings [104].

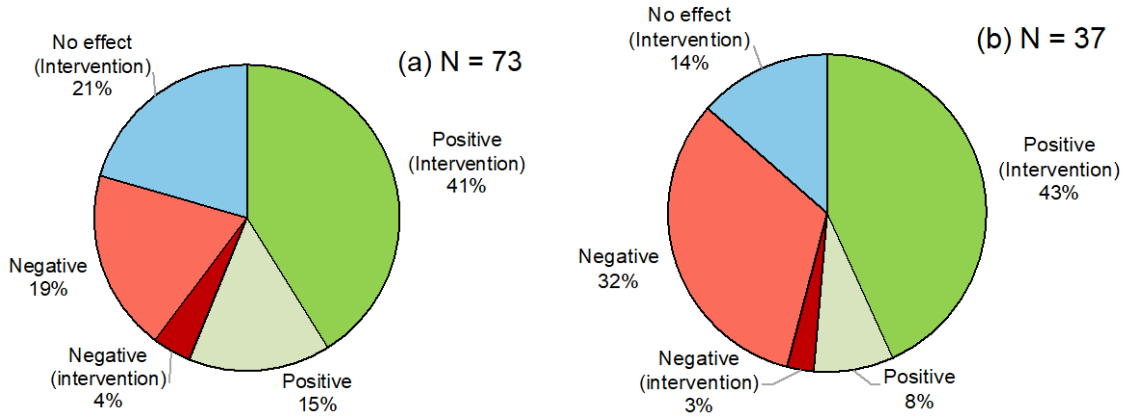


Figure 14: Proportion of social impacts recorded across smallholder farmers (a) and women smallholder farmers (b).

Income level. Multiple studies indicated that richer coffee farmers are less adversely impacted than poorer farmers across dimensions such as cultural value, income, nutrition and environmental risk.

A study in Indonesia found that richer farmers did not experience negative impacts on their cultural values unlike the poorest [105]. This is because richer farmers could better educate their children who then secured well-paid jobs and sent remittances for affording resources, such as livestock, required to partake in religious ceremonies. In Ethiopia, richer farmers did not experience negative effects on their nutrition from coffee pest and disease in contrast to the poorest [106]. Richer farmers had more lucrative coffee production systems which were less vulnerable to attacks, and had income reserves to access food when coffee income subsequently dropped. In Nicaragua, poorer coffee farmers mentioned feeling anxiety over risk to their coffee production and livelihoods from declining water resources under climate change, however richer households did not portray the same anxiety due to their perceived greater capacity to adapt [84].

Country/location. Differences across locations were recorded from studies undertaking a multiple-country approach [23,30,52,61,107–109]. The results varied in dissimilarities of impacts across different countries. [49] researching the effects of certification across Mexico, El Salvador, Guatemala and Nicaragua only found differences in coffee farmer's well-being in nutrition and just for Guatemalan farmers. By comparison, [34]'s multi-country study assessing the impacts of the coffee crisis in Mexico, Guatemala and Honduras found variation between each country and dimensions of living standards, health, education and income. Coffee famers in Honduras, for instance, experienced much fewer negative impacts. One reason hypothesised was that school is free in Honduras until secondary level, which benefitted education and saved income for other necessities.

3.7 Trade-offs amongst dimensions

This sub-section presents findings for RQ6 relating to trade-offs amongst well-being dimensions, i.e. when a dimension is positively affected another is negatively affected. Analysis of trade-offs requires that a study assesses impacts to multiple well-being dimensions, which is done in 55% of the studies. The majority of these studies report mainly positive and no effects (n=35). A total of 17 studies report evidence which may involve trade-offs, out of which 10 investigated policy interventions.

Among the 7 'no intervention' studies implying trade-offs, 3 studies reveal that while dimensions including income, nutrition and sense of security are negatively impacted cultural value is positively impacted [27,28,110]. This was found to be because farmers' personal cultural identity associated with growing coffee was benefitted through coffee production irrespective of negative impacts to other aspects of their livelihoods. Four studies report potential trade-offs between nutrition (decrease) and other dimensions (increase) such as living standards, health and education [38,40,44,111], which may be down to how households choose to delegate their income. In [111]'s study they found that despite coffee increasing household income, the long periods spent in coffee farms by adults reduced the time to prepare children's meals.

Regarding trade-offs linked to policy interventions, there are 9 out of 62 instances where trade-offs could be inferred. Four cases correspond to social certifications, two to environmental certification and other policies and one to aggregated certification.

Akin to potential trade-offs noted in non-intervention studies, nutrition was commonly traded-off against another dimension, most frequently income. All 3 studies, belonging to social certification and aggregated certification groups, which focused on both nutrition and income demonstrated that as one dimension was positively impacted, the other was negatively impacted [63,88,109]. [109] reported that higher income negatively correlated with food security, and therefore the higher income from certification increased incidences of food insecurity. [63] found that Fair-Trade and UTZ farmers grew more coffee, which replaced other food crops on farms. However, selling food crops and livestock generated more income than coffee and reduced expenditure on food for the control group. Certified coffee farmers therefore had higher expenditure on food (indicator used for nutrition), but whilst receiving fewer income.

In environmental certification investigations, potential trade-offs were noted within the SLF dimension. For example, measures of total assets owned decreased as financial capital represented as access to credit increased [48], whilst social capital represented by social cohesion and trust decreased as human capital such as skills and training as well as physical capital assets like farming equipment increased [112]. No other obvious trends in dimensions traded-off or policy interventions were discernible from the results.

3.8 Wider socio-economic impacts of coffee trade

This sub-section concerns the wider socio-economic impacts associated with coffee production. This report considers wider socio-economic impacts as social impacts that are not expressed as individual/household well-being but impacts that may ultimately affect well-being through the complex social-ecological systems in which trade is embedded.

The wider impacts are grouped into 7 broad categories: 1), socio-demographic impacts, such as migration; 2), working conditions, labour rights and child labour; 3), land conflict; 4), gender issues, such as gender rights and gender-related discrimination; 5), other human rights; 6), development of public goods, such as roads, schools and hospitals etc and 7), Macro/meso-economic impacts, such as employment and national GDP. The direction of impacts reported for these are based on reported directions relative to control groups in studies and our own interpretation of descriptions given in studies.

3.8.1 Overview of wider socio-economic impacts

In total, 87 wider impacts are recorded from 69 studies in the sample, with most impacts corresponding to development of public goods (n=25), gender issues (n=21), working conditions (n=20) and socio-demographic impacts (n=14) (**Figure 15**). No studies considered the impacts to human rights, whilst few recorded macro/meso economic impacts (n=4) and land conflict (n=3). Overall, the majority of wider impacts in the sample studied are positive (54%), about three quarters are negative (24%) and 17% have no effect. A direction could not be discerned for 5% of the total impacts because of limited details provided in these studies, for example, when migration occurred but any subsequent effects were unreported [38,50].

The positive effects are mainly distributed in the categories of development of public goods (n=19), gender issues (n=12) and working conditions (n=10) (**Figure 15**). Proportionally, positive effects are highest in the development of public goods (76%), maso/meso economic impacts (75%), gender issues (50%) and working conditions (50%) categories. The negative impacts are mainly distributed in categories of working conditions (n=8), socio-demographic impacts (n=5), gender issues (n=3) and land conflict (n=3). Proportionally, 100% of land conflict impacts are negative, 40% of the working conditions impacts and 36% of the socio-demographic impacts. The proportion of no effects is low with these mainly distributed in gender issues (n=6) and development of public goods (n=4).

We found that the counts and directions of the aforesaid wider impacts often related to the policy interventions studied. Therefore, the wider impacts are disaggregated by policy intervention and non-interventions for a narrative synthesis.

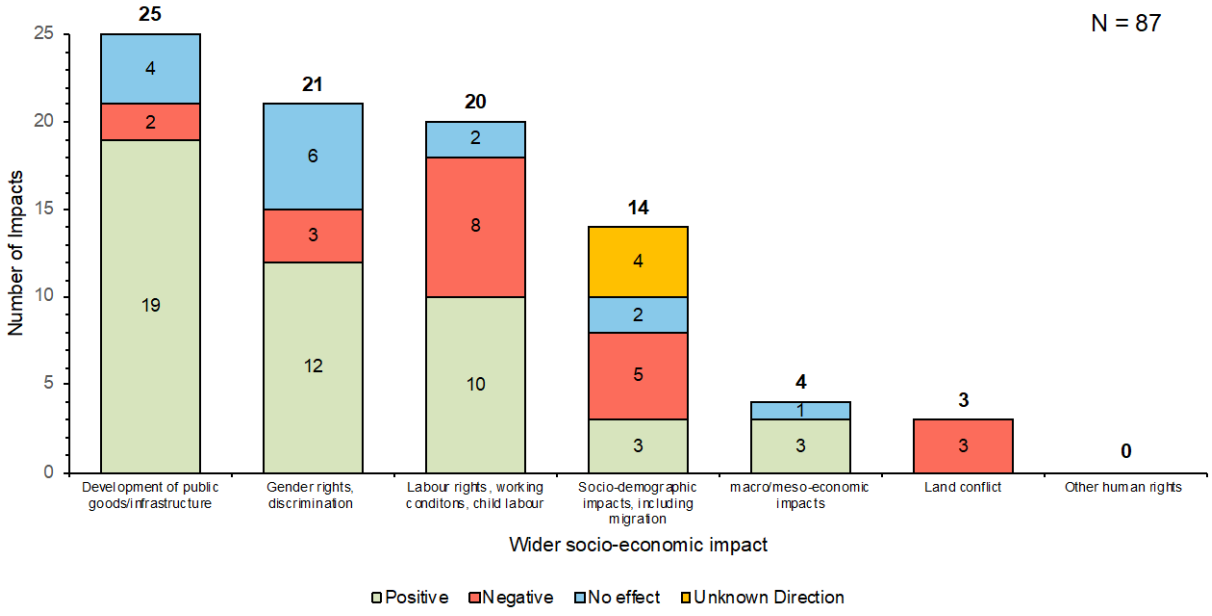


Figure 15: Frequencies of wider socio-economic impacts recorded per group and their respective directions.

3.8.2 Disaggregation by intervention and non-intervention

The disaggregation of wider impacts and narrative synthesis is presented for development of public goods, gender issues, working conditions and socio-demographic impacts because these categories have a sufficient number of observations (**Figure 20**).

3.8.2.1 Non-interventions

In total, 27 wider impacts are recorded (**Figure 16**). These impacts are mainly negative, particularly for working conditions (n=7) and socio-demographic impacts (n=4). Regarding the latter, the outmigration of farmers, youth and labour workers to urban areas, due to perceiving a non-financially viable future for coffee farming, lead to people instead experiencing urban poverty [27], a shortage of hired labourers [34] and vulnerable families and women being left behind [80].

Concerning working conditions, children worked picking and drying coffee beans which lead to missing out on school education [33,103,111]. The wider impact was therefore a mechanism demonstrating how a lack of enforcement of human rights affects the educational well-being dimension. This detailed grey literature report on children's involvement in commercial coffee agriculture in Tanzania argued that working children were subject to risks from cuts and wounds, animal attacks, skin diseases and physical and psychological pain from strenuous work such as carrying heavy sacks of beans [40]. This suggests that child labour has wider social impact than only education.

Other negative wider impacts regard unsafe working conditions in plantations. This included exposure to chemicals and endotoxins without PPE, long working hours (sometimes 16 hours per day), usage of tools without training and heavy lifting of 30-60kg coffee sacks [35,36,60]. Interestingly, more positive than negative impacts are recorded for gender issues (n=3). There were less discriminations of women in coffee farming, especially after out-migration of men, when women adopted production [38,111].

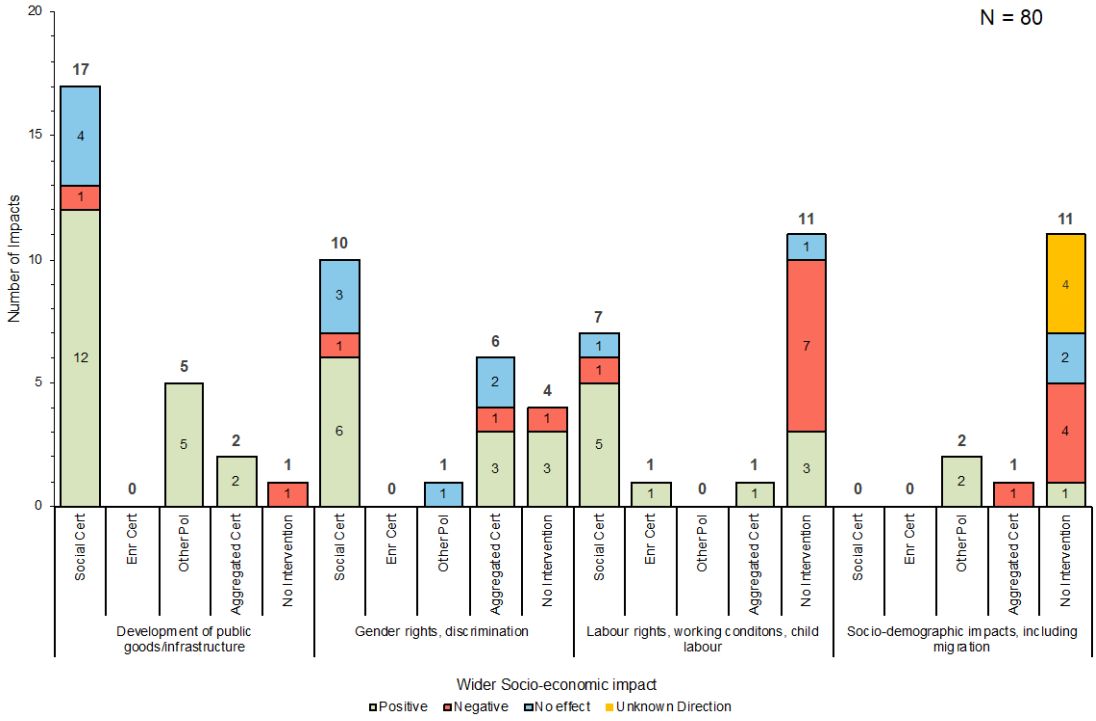


Figure 16: Frequencies of wider socio-economic impacts recorded per group and their respective directions disaggregated by policy intervention.

3.8.2.2 Interventions

Most wider impacts are accredited to social certification (n=34), followed by aggregated certification (n=10) and other policy interventions (n=8) (**Figure 16**). Environmental certification interventions were only associated with 1 wider impact, which may be due to having lesser wider socio-economic aims on their agenda compared to social certification schemes. Fair-Trade, for example, provides a specific premium to certified coffee producer organisations to fund community development. A general trend is observable in **Figure 20**'s categories showing policy interventions mainly associate with positive impacts followed by no effects and negative impacts respectively. This demonstrates that negative impacts are mainly driven by non-intervention cases. The following narratives are presented for each wider impact category.

Development of public goods. Social certification interventions often focused on community development (n=17) creating 12 positive impacts. This derived through the investment of their community premiums, supplied mainly under Fair-Trade and UTZ certification, into community infrastructure benefitting members of communities. This was recorded for school buildings [18,23,30,56,61,89,108,112], transport (to access schools) [88], clean drinking water facilities [51,112], medical facilities such as hospitals [18,30,61,65,89,108], composting tanks [56], water pumping equipment [56], electricity generation [30,94], road construction [47,59] and coffee washing stations [109]. Similar mechanisms affecting public/community goods are reported under aggregated certification because these included Fair-Trade schemes [15,63]. Coffee cooperatives also reportedly invested in community infrastructures like health centres, clean water projects and schools [75,81], which benefit community members outside of coffee farmers. Value chain approaches set-up community pulping units and coffee washing and processing stations [79,94], benefitting local coffee farmers. The mechanisms described for each intervention are identical, but differ in who benefits e.g. only coffee farmers in value chain approaches compared to the wider community for cooperatives and certification.

Not all impacts were positive. Despite investments in schools, poorer children in Mexico could not access schooling due to cost barriers [23]. Also in Mexico, increased social conflicts and tensions were linked to community infrastructure investments [93]. This was because of land ownership issues where infrastructure was built. In other instances, premiums were found to be spent the producer organisation itself, i.e. staff training and offices, leaving little funding for communities to have a measurable impact [18,108]. These cases demonstrate that investments in infrastructure does not always generate positive impact without consideration to local issues, such as land ownership issues and barriers to education. Successful investment in school infrastructure, for example, would be best accompanied by funding for scholarships or uniforms to reduce costs [51,65]. Also, decisions regarding premium spending should follow a democratic process between producer organisations and community members to target key issue areas.

Gender rights and discrimination. Social certification mainly positively impacted women (n=6). Social certification was found to encourage equal opportunities for women and in-turn alleviate gender discrimination in the coffee sector. Such equal opportunities were noted by [61] researching coffee plantations following UTZ certification. Here women were discriminated against where more working hours were delegated to men before this changed. Social certified coffee cooperatives and plantations also provided more opportunities for women within the producer organisation, assigned more working hours to women farmers and paid them the same wages [44,61,95]. In Nicaragua, Fair-Trade certified women received on average 44 more working days per year more than non-certified women

farmers [44]. In aggregated certification interventions, certified women reportedly enjoyed similar rights to attend and debate at community meetings and workshops as the men [73].

Some studies reported that interventions had no or a negative effect on women [15,47,48,83,88,90]. [90] reports that women still faced discrimination regarding participation in Fair-trade cooperatives. Women workers on coffee plantations still reported frequent incidences of sexual harassment and receiving less working hours than men, despite plantations being Fair-Trade USA certified, but feared they lacked the rights to complain and would lose their job [88]. In a study considering the effects of aggregated certification, they found that certified women coffee farmers were discriminated against in markets because they wouldn't be able to bargain for higher coffee prices [48]. In Ethiopia, cooperatives discouraged the participation of women on their committees [15]. Cooperatives maintained that women are not interested in coffee and their place was at home, which perhaps reflects the cultural and societal roles expected of women in some coffee producer countries.

Working conditions. Two main pathways were associated with wider working condition benefits, 1), prohibiting child labour below 15 (years old) and 2), creating safe working environments.

Both UTZ and Fair-trade schemes prohibited child labour in smallholder coffee farms [17] and plantations [61], which is theorised in the coffee literature to enable more time for schooling. Some Fair-Trade premiums are invested in child development projects, which aim to reduce children's involvement in coffee production [30].

Regarding working environments, coffee plantations and cooperatives undertook some actions, such as supplying protective equipment to shield against agrochemicals and training individuals on safe practices, which may result in higher safety for workers and farmers. However, these studies did not directly assess plantation workers and farmers sense of safety and security. Other studies highlighted no difference in the working conditions experienced between UTZ certified farmers and control group [113], whilst another in Kenya reported that conditions were actually worse in UTZ cooperatives leading to illness and loss of labour days [63].

Socio-demographic impacts. Few impacts are recorded for this category. In Mexico, a governmental scheme which encouraged children's school attendance instead of coffee farming was linked with out-migration in the long-term [100]. This had a positive impact because remittances provided more income than through coffee. **Figure 16**'s negative wider impact relates to the negative experiences of spouses left behind from the out migration of coffee farmers resulting from perceived poor coffee prices supplied from cooperatives [73].

4 Discussion of results

This section discusses the main findings of the literature review, the tools and metrics, the literature gaps identified and recommendations for the TRADE Hub research related to international trade in the coffee commodity.

4.1 Key findings

In the following, we first discuss the drivers of social impacts of coffee trade, then provide an overview of direct and wider impacts of trade, according to the multi-dimensional well-being framework, and the effects of policy interventions on those impacts.

4.1.1 Drivers

We found evidence for social, economic and environmental drivers that impacted well-being of stakeholders involved in international coffee trade (section 3.5). The main drivers of social impacts are macro market trends, e.g. trading price, and institutional e.g., changes in government policy. Congruent with the report's background literature (section 1.3.1), market drivers concerned a decline and volatility in coffee market prices and increasing consumer demand for coffee grown in a social and environmentally sustainable way. Multiple social, economic and environmental drivers sometimes acted together, for instance, the environment (climate change) and market economic conditions. However, scant data restricted any robust comparison of the resulting impacts from combinations of multiple drivers compared to single drivers. Further scrutiny of the main drivers showed that many prompted interventions, for example, consumer demand and market prices prompting certification schemes.

4.1.2 Social Impacts

4.1.2.1 Impacts to income and knock-on effects to multi-dimensional well-being.

The main stakeholders examined by the literature on social impacts of coffee trade are coffee farmers (see Section 3.3.5.1).

The results of the systematic review show that, when examining the social impacts of international trade of coffee under current market conditions when sustainable governance policies are not in place, the impacts of trade are primarily negative. As expected, based on the background literature [e.g. 10,13,14], this was particularly true for farmers' income which was frequently negatively affected under low and volatile coffee market prices. This had further financial ramifications for affording coffee's production inputs, causing some coffee farmers to operate at financial losses. In some instances, the resulting out-migration of coffee farmers into urban settings generated a mix of income-related outcomes. Some (more educated) farmers found work and gave remittances exceeding the coffee income, whereas others just migrated into urban poverty instead. This suggests that the less educated coffee farmers could be more at risk of falling into poverty under market drivers.

Income is an output that functions as a mean (i.e. is instrumental) to well-being outcomes [114 Schaafsma et al framework], and therefore income-related knock-on effects adversely impacted farmers' well-being dimensions. This included education, where farmers could not afford school fees resulting in reduced school attendance; living standards, by hindering abilities to acquire basic household goods; health, by hindering access to healthcare linked to costs; and nutrition, by reducing household food purchasing power. Another negative impact on nutrition derived through coffee farmers' lower production of food crops to cultivate coffee and, when coffee income was low, which was frequently, households had few food sources in reserve.

There were some positive impacts on income linked with income stability, because coffee is a non-seasonal crop, and reduced income poverty when market prices were high. Such stability positively impacted nutrition by alleviating household food shortages. However, such positive impacts were seldom observed in the literature. The importance of income in relation to impacts on other well-being dimensions was also shown in section 3.6.3, where variation in farmers' income showed that richer farmers experienced fewer negative impacts to their well-being compared to poorer farmers. This suggests that the instrumental relationship of income, in terms of coffee income, to farmers' well-being is more prominent for poorer coffee producers. Therefore, market drivers affecting coffee income are more detrimental to the well-being poorest coffee farmers indicating that coffee trade is less sustainable for the poorest.

This means that there was little scope for robust assessments of any differences in impacts across stakeholder groups along the value chain. As well as overlooking the impacts of coffee trade and policy interventions on other value chain actors, and therefore only partly capturing social impacts, the lack of available data means that understanding into the distribution of coffee and policy related benefits along the value chain is unclear. Effective policy interventions should ensure reasonable benefits along the coffee value chain for socially sustainable trade, particularly downstream. However, current evidence is insufficient to discern whether, which, and how policy interventions could effectively achieve this. The following impacts discussed therefore mainly pertain to smallholder coffee farmers. Where stakeholders differ, this is specifically highlighted.

4.1.2.2 Other social impacts

Other negative wider socio-economic impacts associated with international coffee trade regard poor working conditions in coffee plantations, employment of child labour and unsafe working conditions from exposure to chemicals and lack of Personal Protective Equipment (PPE). These working conditions could be linked with effects on education, living standards and health. Studies, for example, empirically correlated plantation worker's exposure to chemicals and dust particles with negative impacts on their physical health [35,36]. Children labouring in plantations were also at risk from adverse impacts to their physical and mental health from long periods of strenuous work and risks of animal attacks and expending energy here instead of in school. Families housed on these plantations are sometimes housed in small one room accommodation provide poor conditions for living standards. These results importantly show that the social impacts of coffee trade can extend beyond income-related impacts for those lower down the coffee value chain.

4.1.3 The effects of policy interventions

To address these negative impacts policy interventions of social certification, environmental certification, aggregated certification and 'other' policy interventions have been implemented. We assess their effects on modifying these social impacts through this review. The effects of certification are widely debated in the academic and grey literature with mixed views and evidence [3,4,5,6,7,115,116]. Our results indicate that in general policy interventions linked with coffee trade, including certification, positively impact well-being. However, in dimensions such as income and nutrition, different certification types had little effect (**Table 5**). Studies examining policy interventions generally focused on examining the effects on the well-being dimensions that coffee trade negatively impacts. This either suggests that interventions are appropriately targeting the social impacts, or there is a bias in studies towards certain dimensions of well-being. One exception was livelihood assets (SLF), which wasn't considered in non-intervention studies.

4.1.3.1 Income-related interventions targeting the negative impacts

Based on section 3.5.3's results, certification interventions were found to target producers' income to alleviate the negative impacts and enhance the positive impacts to well-being under market and institutional drivers. The effects of different policy interventions on income are mostly discussed collectively here because their mechanisms targeting income were similar, for example, increasing prices and coffee productivity.

Prices and production costs. In general, higher and more stable prices were gained from higher farm gate prices and premiums through certification. During periods when conventional coffee market prices were high, these gains were less pronounced. Cooperatives also generally increase coffee prices through their greater collective negotiating power. Higher coffee prices were beneficial when coffee production costs remained manageable. Studies reporting no effects or negative impacts showed that higher production costs due to certification regulations, such as increased worker wages (Fair-Trade) and greater labour requirement to practice organic methods (organic), were less financially manageable and offset pricing benefits. Such counteracting impacts were more frequently noted in social certifications, such as Fair-Trade, than environmental certification, suggesting that social certification rules and regulations are more costly. Conventional coffee cooperatives reduced coffee production costs by training farmers on production methods and cheaply supplying inputs and equipment, but these cooperatives do not conform to costly certification rules and regulations. A different approach to pricing gains was undertaken by value chain approaches. These interventions increased prices paid to producers by shortening the value chain and number of actors to distribute more of the value downstream to producers. A shorter and more exclusive supply chain was also another reason why environmental certification schemes could return higher coffee prices than social certification [62]. This suggests that shortening coffee supply chains may be an apt mechanism to reduce the negative impacts of coffee trade on coffee farmers' income.

Productivity. Increased production costs also hampered coffee productivity because some producers could not afford the required inputs and labour for cultivation. Poor coffee yields were, however, a factor found to more commonly hinder environmental certification's income benefits than social certification. Transitions to organic farming and bans on agrochemicals were documented to reduce coffee yields to levels where it impacted coffee profitability (section 3.4.4).

Social certification and cooperatives generally increased coffee yields, and therefore income, by educating members on best practices and processes which also enhanced coffee quality. Access to credit (to support production costs) and equipment supplied by certified cooperatives also likely contributed to improving coffee yields. Regarding 'other' interventions, coffee agroforestry positively impacted income by reducing production costs but also yields. This could suggest that coffee yields may not be as critical as production costs and pricing.

Market demand and traded volume. Increased coffee yields did not always translate into improved income under social certification. Some studies highlighted that supply often exceeds demand in certification markets. Therefore, producers sold higher value coffee through conventional markets at a lower price. Producers also sold to conventional coffee markets for the immediate full payment because payments are staggered when selling through certification channels. Whether, and by how much, an individual sells higher value certified coffee through conventional channels likely depends on their changing household needs and current market demand. These quickly changing circumstances varying across

time and location are why the effects of certification on income cannot always be deemed clear cut.

Summary. The analysis suggests that social certification generates more limited effects related to enhancing individual and household income than environmental certification. This is reinforced by the greater counts and proportion of 'no effect' results for social certification compared to environmental certification and environmental certification's greater positive impact count Figure 8b shows. This finding is compelling because social certifications, like Fair-Trade, are more focused on income whereas environmental certification schemes are more concerned with the environmental impacts.

Income-related well-being benefits. Given the instrumental relationship of income with well-being, it is expected that income-enhancing policy interventions also positively impact multi-dimensional well-being. The results generally support this, with mainly positive income-related impacts on nutrition, health, education and living standards. Concerning education, increased coffee income related with certification (Café Practices and Fair-Trade) was positively associated with increased children's schooling attendance and duration in school. Regarding health, improved coffee income under Fair-Trade certification improved healthcare access to those when it was needed. Improved income under certification also subsequently increased expenditure on housing and living standards. Overall, the analysis so far shows that income-related mechanisms that interventions employ mainly provide positive impacts to well-being from coffee trade.

4.1.3.2 Other interventions targeting negative impacts

Although income-related mechanisms employed by interventions influence well-being outcomes, the recorded effects on producer income do not exactly mirror the effects on other well-being dimensions. Policy interventions also impact well-being through other mechanisms such as by improving livelihood capital assets. Livelihood capital refers to bundles of assets [117]. Assets refer to human and non-human resources on which livelihoods are built [118].

Individual and community assets. These findings of certification's effects on assets are largely consistent with [4]'s systematic review linking certifications and livelihood assets. The assets targeted by interventions are likely targeted as these can increase coffee production and processing efficiency.

- Coffee farmers' financial capital was commonly improved by cooperatives through increased access to credit and financing services. However, positive impacts were only noted for certified cooperatives, which may suggest that conventional coffee cooperatives lack the capacity to effectively provide such services.
- Human capital was generally positively impacted by almost all interventions. As section 4.1.3.1 discussed, coffee farmers developed new skills and farming methods from the training provided by interventions to improve coffee yields. This shows simultaneously income and capacity building benefits.
- The effects of certification on social capital are less straightforwardly measured. The results indicate that social networks, trust and reciprocity amongst communities, certified members and cooperatives are nevertheless strengthened through member meetings and sharing of financial credit.
- Similarly, physical capital was mostly improved upon under all interventions. At the individual level, interventions supplied inputs and equipment aimed to improve coffee productivity and local processing. At the community level, community premiums-built water pump stations and coffee washing stations. Providing local washing facilities

could reduce expenses on transportation during the processing stage of the coffee supply chain (see section 1.3.2). The findings regarding the elite capture of community physical assets may mean not all community members can access them, however.

These findings demonstrate the positive benefits resulting from the top-down multi-scale interaction between regulations from certification bodies and cooperatives, because the evidence shows that this enhances farmers' and communities' resources required for coffee production and processing.

Wider socio-economic and multi-dimensional well-being impacts. In terms of addressing the adverse working conditions described on coffee plantations, the effects of social certifications, like UTZ and Fair-Trade, are mixed. Unsafe working conditions, regarding PPE and exposure to chemicals, are not always consistently improved, and in one case in Kenya worsened causing illness [63]. Insufficient evidence on the effects of interventions on child labour restricts any commenting on the effects, though bans on child labour under certification rules would probably improve school attendance. Ethically conscious businesses seeking to improve the working conditions in coffee plantations in their supply chain cannot be guaranteed the desired effects using UTZ or Fair-trade certification based on these findings.

A positive correlation can be discerned linking impacts on education and health and the investment of the community premium. Investments in school scholarships positively affected children's school attendance, although only children of Fair-Trade members, and enhanced school infrastructure. Community premiums also helped construct healthcare facilities such as hospitals in communities. Under certification, improved access to healthcare through increased income positively impacted certified farmers' health. Given that both should improve healthcare access it is surprising that several studies on social certification yielded 'no effects' outcomes for health. Improved healthcare access for all community members may have masked the health benefits provided under certification because non-certified farmers from the same community could also benefit. Finally, community premiums were used to construct facilities for clean water access. This should improve water access and sanitation (living standards) for communities, though this reasonably inferred rather than empirically measured.

These positive impacts are mainly associated with social certification, which specifically employ community premiums. Although social certification encounters marginally more issues than environmental certification in addressing negative impacts to farmers' income, social certification indirectly and positively impacts farmers' well-being and communities via community premiums. In this respect, social certification could be deemed more advantageous than environmental certification that businesses adopt to alleviate the negative and enhance the positive impacts of coffee trade. The social certification benefits here should be carefully weighed against the marginally better income benefits from environmental certification. This may depend on what impact businesses aim to achieve. Lastly, to ensure that community premiums are effectively invested the evidence suggests that decisions must consider local contextual factors and issues using input from community members.

Section summary. Policy interventions affect well-being mainly through various income-related pathways. Some well-being dimensions are more directly influenced by income, such as nutrition and living standards, and while others are less closely tied, such as health and livelihood assets and benefit also community premiums and other cooperative activity. Because policy interventions in one way or another target income (community and

household), which has knock-on effects to other dimensions, this implies that multi-dimensional well-being should be positively impacted. The empirical results of studies mostly support this. These findings have implications for businesses and governments concerned with coffee supply chain sustainability and dimensions of well-being. Businesses targeting improving food security and living standards in producer countries could adopt interventions, that are more likely to increase producer's household income, such as environmental certification. Others aiming to improve well-being more generally and foster community development may use Fair-Trade.

Lastly, some evidence indicated that marginalised farmers, in terms of their age (older), less education, poor access to technology, low income, low asset ownership, poor access to roads, long distances to cooperatives and poor social networks, were less likely to be certified (section 3.4). As discussed, coffee certification overall positively impacts well-being. This potential means that a greater proportion of coffee farmers exhibiting characteristics may not experience the benefits, which should be considered by business and government in decisions about enhancing the sustainability of supply chains. This is also an important finding for certification bodies because more vulnerable and marginalised coffee producers are often main target groups. Appropriate action should be taken to ensure more marginalised farmers uptake coffee certification given its (mostly) positive benefits for well-being and reducing the negative impacts of coffee trade.

4.1.4 Gender-related impacts of coffee trade

Gender-related impacts of trade are high up on the international development agenda. In non-invention studies, women coffee farmers experienced more negative and fewer positive social impacts than men from coffee trade (section 3.6.3). Women would receive less income from coffee, and subsequently less control over household resources and decisions, negatively affecting their well-being. This suggests one of two points for contemplation: 1, gender disaggregated studies select cases where the known social impacts experienced by women coffee farmers are negative, or, 2, coffee studies which do not disaggregate impacts can present a more socially positive picture of coffee production than when impacts are disaggregated. These findings imply that studies should disaggregate results by gender, if only to show there is some equality.

Interventions by certified and non-certified cooperatives address negative impacts on women by specifically marketing 'women's coffee' to appeal to conscious consumers. The resulting improved income for women increased their freedom of choice. Some cooperatives without a clear focus on women failed to involve women coffee farmers in cooperatives because it clashed with believed gender roles. This demonstrates that improving women's income and freedom of choice requires interventions with specific focus on women.

Regarding wider gender issues (women's discrimination), there is a greater involvement of women in coffee farming. However, as workers in coffee plantations women were sometimes paid less, received fewer working hours and were harassed. Social certification interventions targeting gender equality, namely Fair-Trade and UTZ, managed to reduce some of these wider gender issues. However, not all had been successful, for example, Fair-Trade USA.

Socio-cultural barriers in producer countries seem to inhibit the effectiveness of interventions in reducing negative impacts on women from coffee trade. Overcoming these barriers may require careful consideration to local cultural contexts and norms. This arguably could be better achieved using more local-level intervention, such as women's cooperatives and programmes. Businesses and governments seeking to address negative impacts on women

coffee farmers associated with coffee trade should consider these more local specialised interventions. For wider gender issues, UTZ and Fair-trade may be better suited.

4.1.5 Sustainability of policy interventions

To examine the effects of policy interventions on coffee trade sustainability we used the SDGs 1, 2, 4, and 8 (**Figure 10**). Scant evidence prevented the assessing the sustainability of policy interventions in relation to gender equality (SDG 5), affordable and clean energy (SDG 7), industry innovation and infrastructure (SDG 9), reduced inequality (SDG 10), sustainable cities (SDG 11) and peace and justice for strong institutions (SDG 16).

Overall, policy interventions clearly improved upon sustainability of coffee trade according to the SDGs. Social certification is the most sustainable intervention for enhancing the quality of education in producer countries (SDG 4) and performs well in progressing decent work and economic growth (SDG 8), as do environmental certification interventions. Regarding SDG 2 – zero hunger – and 3 – good health and well-being -, there are a mix of no effect and positive outcomes under coffee certification. Therefore, it cannot be ascertained whether coffee certification is sustainable in relation to alleviating hunger and improving health and well-being. Progress in reductions in income poverty are fostered by social certification, environmental certification and other policy interventions (SDG 1). However, there are also a number of no effects outcomes. This suggests that in a notable number of studies these interventions were not sustainable regarding income poverty alleviation. This is likely consequential of the relatively mixed effects of interventions on coffee farmers' income in some studies. For coffee trade to be sustainable in terms of poverty reductions, policy interventions must address the limiting effects section 4.1.3.1 outlined to hinder coffee farmers' income.

Overall, from the evidence reviewed, coffee certification is the most apposite interventions to endorse which enables coffee trade to facilitate progress towards sustainable development. For producer countries seeking to enhance the quality of their education through coffee trade, the UK government should specifically endorse the adopting social certification interventions in these countries.

4.2 Tools and metrics

The results showed that quantitative methods were predominantly used except for lesser studied well-being dimensions of sense of security, cultural value, environmental risk and subjective well-being (section 3.3.1.1). Field surveys were the primary quantitative data collection method, whereas semi-structured interviewing and focus group discussions were the main qualitative data collection methods.

Many indicators were identified in the study sample, and we grouped these to derive Table 5's indicators. Most well studied well-being dimensions exhibit one or two dominant indicators, which coffee research may wish to use empirically or explore in existing secondary datasets, for example, farming profitability for income and access to healthcare for health. On average, dimensions had 4 indicators each. Including such indicators would enable comparability to previous work. However, some indicators, such as cooking fuel, feelings of safety and exposure to climate/environmental risk, were seldom used. In some cases this may indicate relatively low relevance, in others a knowledge gap.

Regarding approaches to assessing the effects of policy interventions, coffee studies commonly employed control group approaches. These measured difference in well-being indicators theorised to change under the intervention between control and intervention

groups. TRADE Hub studies measuring the effects of policy interventions on stakeholder well-being should consider undertaking this approach and could adopt Table 5's recommended methods and indicators.

4.3 Main literature gaps

This section uses the report findings to outline research gaps relevant to the TRADE Hub work and recommends avenues for further research. This section is structured into gaps in assessments of policy interventions and well-being dimensions.

4.3.1 Gaps in trade policy intervention studies

The available evidence in the coffee literature has enabled us to comment on the measured effects of certain coffee certification schemes such as Fair-Trade and Organic certification. However, a lack of research on other policy interventions restricts this review commenting on alternative policy interventions.

Other certification interventions. The social certifications of C.A.F.E practices (n=3) and 4C certification (n=3) are seldom examined in academic and grey literature. The measured effects of social certifications are mostly dominated by Fair-Trade (n=41) and UTZ (n=9), meaning that the effects of C.A.F.E practices and 4C certification remain relatively unknown. Excluding Nespresso AAA (n=1), other environment certification schemes, including Fair-Trade Organic (n=10), Rainforest Alliance (n=8) and Organic (n=18), are relatively well studied. Therefore, in general, the measured social impacts reported from environmental certification interventions are relatively better known than social certification. Future TRADE Hub coffee research could prioritise examining the effects C.A.F.E. Practices and 4C certification to help generate new knowledge related to certification. But how widespread these interventions are in coffee producing countries is unknown.

Another literature gap regards a dearth of assessments into the combined effects of multiple certification interventions. Combined UTZ and Rain Forest Alliance, for instance, potentially mixes areas of environmental protection with training on improving coffee productivity, which may provide interesting socio-environmental outcomes relevant to both the TRADE Hub's people and wildlife focuses. Fair-Trade + Organic to some extent could constitute combined certification, however the number of assessments is relatively small and only considers two different certification schemes, of which the individual effects are already well evidenced. The coffee research community would benefit from the study of the effects resulting from different combinations of policy interventions. Furthermore, study into the effects of multiple policy interventions should not be limited to certification schemes; evidence regarding the effects from the combined effects of certification and other policy interventions were also limited. TRADE hub coffee research focusing on policy interventions could study cases/areas whereby the effects from multiple certifications and policy interventions can be examined. The Kilimanjaro region of Tanzania offers a potential location [94].

Other types of policy interventions. The effects of coffee cooperatives were fairly well studied (n=12). Less well studied were interventions like changes in farming practices (n=2) and value chain approaches (n=4). The value chain approaches yielded some different results regarding the directions of impacts; however, the scarcity of assessments restricts a more robust evaluation of the effects. Given the TRADE Hubs interest in commodity value chains, future research on exploring the effects of interventions constituting a value chain approach could be conducive.

Another desire of the TRADE Hub is to generate relevant material for businesses. Few business-initiated interventions were found in the sample studied. Relationship coffee [79], which was categorised under value chain approach, and Starbuck's C.A.F.E. Practices interventions could be deemed business related interventions, but studies on these schemes were uncommon and insufficient to generalise. To be able to provide relevant material for businesses the TRADE Hub will need to gather more empirical data on the effects of business interventions because it is neglected in current literature.

Other gaps. We were unable to meaningfully comment on 'no effects' outcomes when comparing the effects of different policy interventions on drivers where information on the socio-economic conditions of control groups was unreported. Such information would be useful to recognise whether in cases of 'no effect' the conditions of the intervention group remained socio-economically poor, or whether the group was socio-economically better off anyway. This would allow comment on whether policy interventions were successful in supporting groups of different wealth.

4.3.1 Gaps in coffee well-being studies

This sub-section outlines the literature gaps regarding the scale of studies, the stakeholders of which well-being is examined, and gaps in the well-being dimensions studied.

4.3.1.1 Scale and multi-country studies.

This report indicates that few studies have been conducted at the global, regional and national level (see section 3.1). Additionally, few studies (n=9) undertake a cross-country comparison of the social impacts, and even less (5%) conducted a comparison across multiple countries spanning more than one continent. The results revealed that multi-country studies can highlight intercountry differences of impacts, which are perhaps linked with different country socio-economic contexts [34] (see section 3.6.3). To identify whether coffee trade expansion is a force for good at the understudied national and international level, ensuing TRADE hub coffee work could consider multi-country studies spanning different continents to capture potential variation in social impacts.

4.3.1.2 Stakeholders.

Section 3.6.2 showed that studies predominantly examined the social impacts to smallholder coffee farmers (producers). Scant attention was given to other stakeholders including other crop farmers, producer organisations such as cooperatives, rural residents, businesses, indigenous people, governments and NGOs. As well as addressing clear gaps in coffee trade literature, data collection on measured directions of social impacts on the various stakeholder and value chain actors by the TRADE Hub could provide valuable evidence to understand the distribution of the benefits down the coffee value chain, and how/if this changes under different policy interventions. A lack of data on the distribution of benefits across the coffee value chain has been highlighted in other coffee reports [10]. The TRADE hub conceptual framework provides the necessary scope to analyse such data through its consideration to multi-scale actors and interactions, causal relationships and feedbacks.

As discussed in section 4.1.4, the disaggregation of the impacts experienced by stakeholders could reveal a less positive picture for some stakeholders and that coffee studies should disaggregate to reveal any (in)equality. Ensuring that TRADE Hub coffee research collects the relevant data to enable such disaggregation is emphasised.

4.3.1.3 Well-being dimensions.

There was little evidence available to examine trade-offs between well-being dimensions from linked coffee production and policy interventions (section 3.7). Trade-offs had to be

inferred and limited evidence restricted explanation of why trade-offs occurred. Paying due attention to any trade-offs in ensuing TRADE Hub coffee research would provide valuable input to the coffee literature where trade-offs are clearly not well evidenced. This could better capture all the negative and positive social impacts to people and provide a more nuanced account of coffee trade impacts.

The results revealed that impacts to social relations, cultural value, environmental risk and subjective well-being dimensions are seldom studied. Of those few studies, these demonstrated a strong association between coffee and these understudied dimensions, for example, farmers' cultural identity associated with growing coffee [27]. To ensure that social impacts are holistically captured to provide a fuller account of whether coffee trade is socially sustainable future TRADE hub research should measure these dimensions. In doing so, this also generates data relevant to SDGs 1, 5 and 16, the latter two of which require more data according to the report findings.

Indicators and methods. Following Table 4's methods and indicators, cultural value can be studied by exploring the effects of coffee expansion on farmers' cultural identity using semi-structured interviews. Regarding sense of security, impacts could be examined using indicators of land tenure security and feelings of safety and fear by adopting semi-structured interviews and focus group discussions. Impacts to social relations could be assessed using family and community ties and relationships indicators through field surveys and semi-structured interviews. Impacts to environmental risk could be examined using semi-structured interviews that explore themes of wildlife crop damage and climate-related risk associated with coffee. Lastly, for assessing subjective well-being (n=1) using indicators borrowed from well-being literature, such as perceived happiness and life satisfaction, may be suited.

Income. Based on the evidenced impact pathways, the social impacts associated with coffee should be studied alongside impacts on income. The reliability of income assessments was sometimes hindered by studies adopting different income measures, which somewhat restricted comparisons across studies. Any TRADE Hub coffee studies should consult the various income measures in this report sample to ensure comparability of any results (see annex 6.2).

Regarding the income indicators, the majority focus on coffee farming profitability rather than household income (Table 4). However, household income can be seen as a more apt measure than coffee profitability to gauge the overall income available to pursue livelihood and well-being outcomes [10]. The report evidence showed that income generated from other high value crops had an important effect on household income outcomes [31–33,51,63], and was one reason why sometimes certification did not yield positive income results [63]. These contributions to household income could be missed by only focusing on coffee profits. This may have knock-on consequences for measuring income linkages with, and examining impacts to, other well-being dimensions needed to portray a more complete account of trade-related social impacts.

Included in these household income assessments should also be measures of coffee profitability, including measures on pricing, coffee productivity and production costs. Coffee market pricing at the time of data collection was found to influence the well-being outcomes [41]. Therefore, TRADE Hub studies should consider this factor when interpreting results, particularly in assessments of interventions. The results showed that differences in the aforesaid profitability measures largely influenced income assessment outcomes, especially when examining the effects of interventions [see for example 13,43,49,51]. However, in examinations of social certification interventions control group studies provided limited

understanding into the mechanisms explaining changes in income. This was instead inferred using findings from the descriptive studies (see section 3.4.4). TRADE Hub work examining interventions should consider employing a mixed-method approach where qualitative research can elucidate the explanatory mechanisms for any income differences quantitatively measured. Following Table 4, mixed-methods research could entail semi-structured interviewing alongside field surveys. Qualitative themes could explore why and how much, and when, coffee is sold through certification channels and conventional channels, when coffee payments are received and how this timing effects balancing household income needs.

5 Conclusion

The overarching aim of the systematic review was to assess the social impacts associated with coffee trade in producing countries. This review denotes that coffee trade is generally linked with positive social impacts, but only mainly under policy interventions. Without policy interventions, coffee trade is mostly associated with negative social impacts. Analysis of the well-being indicators conceptually mapped onto the relevant SDGs similarly indicates that coffee trade fosters sustainable development in producer countries, but only when under policy interventions, such as certification. Coffee trade otherwise inhibits progress in sustainable development in terms of alleviating poverty, reducing hunger, improving health and well-being and enhancing the quality of education.

Policy interventions studied in the literature mainly functioned by seeking to enhance the individual and household income of coffee farmers further down the coffee value chain by increasing coffee prices and yields. This was to protect from market drivers accredited with changes in coffee markets over the last two decades. The increased income then also mainly positively impacted well-being through dimensions such as education, living standards, freedom of choice, nutrition, and health. Community premiums paid to certified cooperatives also indirectly positively impacted coffee farmer's well-being, as well as community members through development in public goods and infrastructure.

Some policy interventions were found to perform better in reducing the negative and enhancing the positive impacts to various well-being dimensions. A key example in the context of income is environmental certification and income, which benefitted income more often than social certification. Social certification was somewhat constrained by factors including market demand and production costs. However, social certification performs better in generating impacts on well-being more broadly and in providing wider community benefits through investments of community premiums. Regarding improving coffee trade's impacts on women, local and more women specific interventions seemed more effective. These findings have implications for governments and businesses because they highlight which and how certain social aspects of their coffee supply chains can be more sustainable.

Although this review provides detailed insight into the impacts of coffee trade on multi-dimensional well-being, the current empirical literature only allows a certain level of analysis on coffee trade's social impacts. Scant empirical examinations on impacts to social relations, environmental risk, sense of security, cultural value and subjective well-being limits deeper insight into how coffee trade and policy interventions impact multi-dimensional well-being. This review provides indicators which future research can adopt to examine the impacts to these understudied dimensions. More coffee studies conducted across larger scales would also recognise whether and how impacts differ across contexts and countries. The relatively few numbers of larger-scale studies in the sample limited comment on this.

While we sought to examine the effects of other policy interventions in addition to certification, the review demonstrates that few studies considered interventions such as value chain approaches needed to compare with coffee certification. As discussed, value chain approaches which shorten the value chain undertake a different mechanism to coffee certification to positively impacted income. Therefore, value chain approaches are worth exploring further in future coffee-trade assessments. Regarding certification, much was learnt about the effects of schemes such as Fair-Trade, UTZ and Rainforest alliance. However, less was learnt about the effects of C.A.F.E. Practices and 4C certification, as well as the combined effects of different certification schemes together.

Another important recommendation of the review is for more empirical examination into the impacts of coffee trade and interventions on a greater variety of coffee value chain actors. Insight into the impacts of coffee trade provided from this review is somewhat restricted due to smallholder coffee farmers being by fair the main value chain actors that the empirical literature studies. The different impacts and distribution of benefits along the coffee value chain's actors therefore remain relatively unknown, and subsequently the overall impact of coffee trade on the coffee value chain.

In summary, further research is needed on the lesser studied dimensions of well-being dimensions, policy interventions, scales of study and on different value chain actors to provide a more complete account of the sustainability of coffee trade.

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6 Annex

6.1 List of organisations used for grey literature search

Organisation	N of hits
Biodiversity International	11
CGIAR	11
CIFOR	24
FAO	25
IIED	42
IMF	0
IUCN	7
UNEP	2
World bank	11
unctad	47
aiddata	0
care international	18
conservation evidence	4
UNEP-WCMC	0
UNDP	3
WWF	72
Rainforest Alliance	0
4c certification	0
Starbucks c.a.f.e practices	0
nestle aaa	0
utz	15
Fair-trade international	31
sara lee	0
proctor and gamble	0
inmecafe	0
anacafe	0
hounduran Coffee institute	0
instituto mayor campesino	0
Association of organic coffee growers	0
smithson bird friendly coffee	0
keurig green mountain	0
tanzania coffee board	0
tanzania coffee association	0
trase	0
sustainable food lab	0
conservation international	0
world coffee research	0
ckan	0
International coffee organisation	1
The European alliance on agriculutral knowledge	1
ce delft	1
mafap	1

6.2 List of more specific and grouped quantitative indicators

WB_dimension	Indicator	Grouped Indicator
Income/expenditure	coffee net income (per ha)	farming profitability
	trading coffee price	farming profitability
	coffee income (yield * price)	farming profitability
	gross coffee income/margins (generally includes yields, prices, production costs)	farming profitability
	gross margins, absolute and relative MDP	farming profitability/multidimensional poverty index
	Coffee (including premiums) net returns	farming profitability
	coffee gross revenue; income per capita; change in incidence of poverty line ($1.25 a day)	Faming income/household income
	household income; income per capita; change in incidence of poverty line ($1.25 a day)	Household income
	household expenditure	household expenditure
	wages	wages
	gross profit (coffee only), total household income (including outside coffee), poverty probability index	Farming profitability/household income
	household income	Household income
	net farm income per ha, including income per crop (more than coffee was grown) and income from non-agricultural sources, and net coffee income per ha (gross revenue minus production costs). Poverty gap comparing income between the groups using the Foster-Greer-Thorbecke formula and poverty lines of $1.25 and $2.00 a day.	Farming profitability/household income
	Perceived living income	Farming profitability/household income
	women's income from coffee	farming profitability
	Farming income	Perceived living income
	net household income and expenditure	Household income/household expenditure
	Net coffee income and total household income. Change in household poverty status using income per capita and Ethiopia's national poverty line (3781 ETB per year).	Farming profitability/household income
Health	respiratory symptoms such as coughing, breathlessness and wheezing	Physical Health Impact
	seeking of healthcare	Access to Healthcare
	ability to afford healthcare	Access to Healthcare
	Respiratory health symptoms (a list of 19 were used)	Physical Health Impact
	Perceived access to healthcare	Access to Healthcare
	expenditure on healthcare	Healthcare expenditure
	access to healthcare and % of households with cooking ventilation.	Access to Healthcare/cooking ventilation
	access to healthcare	Access to Healthcare
Nutrition	proportion of population whose food intake is below minimum dietary requirement	Food Consumption Measure
	Food security index from 1-7 based on perceptions of food produced, periods of hunger and food access	Food Security Index
	perceptions on meeting basic nutrition needs	Perceptions
	food security indicators (not disclosed)	Food Security Index
	food consumption in last 7 days converted into calorie, nutrition and micronutrient values	Food Consumption Measure
	BMI; World Bank's growth standards index; food insecurity experience index (FIE)	Physical Measurement/Food Security Index
	Household food insecurity access scale (HFIAS) - Based on perceptions, the HFIAS asks questions on experienced food security in the last 12 months. If positive, then the frequency of this occurrences is recorded. If a household received zero points it reported that the event did not happen, one point if it rarely occurred (1 or 2 times), two if it sometimes (3â€“10 times) and three if it occurred often (more than 10 times). The sum of these frequency scores for nine HFIAS questions then yields a food insecurity score.	Food Security Index
	Perceived food insecurity and malnutrition	Perception
	Frequency of food scarcity periods experienced grouped into 3 categories - rarely or once or twice (days) a month; two about 3-10 times per month; three more than 10 times per month	Food consumption Measure
	food expenditure and 7-day recall diary on nutrient consumption	Expenditure on food/Food Consumption Measure

	Food security indicators - alternative income sources, food production and food shortage experiences	Food Security Index
	expenditure on food	Expenditure on food
	number of days of hunger	Food Consumption Measure
Education	children's school attendance and duration	School attendance/Years completed
	proportion of children enrolled in school	School attendance
	ability to pay school fees	Access to education
	children's years of schooling completed	Years completed
	Children's (ages 10-14) school attendance	School attendance
	Perceived access to education	Access to education
	number of years schooling and expenditure on school fees (includes uniform, tuition fees etc)	Years completed/expenditure on education
	children's school attendance	School attendance
	expenditure on education	expenditure on education
Living standards	expenditure on household items	Expenditure on housing
	ability to acquire basic household goods	Ability to acquire basic household goods
	housing	Housing
	expenditure on housing	Expenditure on housing
	electricity	Electricity
Cultural value	ability to practise ceremonies	ability to practise ceremonies
Freedom of choice	empowerment and equity	Empowerment
	empowerment, control over resources and equity	Empowerment
	empowerment (decision making and control over income)	Empowerment
	Participation and leadership roles (women)	Participation
	women's participation	Participation
	Gender asset gap	Gender asset gap
Sense of security	Feelings of anxiety	Feelings of anxiety
	land tenure security	land tenure security
Environmental risk	perceived exposure to climate risk	perceived exposure to climate risk
Social relations	social relations	social relations (with whom?)
	family and community ties	family and community ties
Sustainable livelihood framework	land size	Natural capital asset
	access to farming equipment and machinery (physical)	Physical capital asset
	Loss of assets i.e. livestock/land	Natural capital asset
	skills and knowledge (human cap)	Human capital asset
	farm training (human)	Human capital asset
	access to loans and credit (financial cap)	Financial capital asset
	Gender asset gap	gender asset gap
	amount of household assets	Physical capital asset OR Financial capital asset
	change in trust, commitment and satisfaction (with cooperatives) (social cap)	Social capital asset
	change in knowledge, skills and training (human cap)	Human capital asset
	access to fertilizer and pesticide (physical cap)	Physical capital asset

6.3 List of more specific and grouped qualitative indicators

Theme/Indicator	Grouped indicator	Dimension code
income (descriptive)	household income	1
empowerment	empowerment	8
income from coffee	farming profitability	1
presence of malaria	Physical health impact	2
children school attendance	School attendance	4
women's gender equality	Gender equality	8
feelings of safety	feelings of security	9
household family relationships	family and community ties	11
Individuals perceptions nutrition	Perceptions of nutrition	3
Individuals perceptions living standards	Perceptions of living standards	5
Cultural identity (with growing coffee)	Cultural identity	7
Feelings of anxiety	Feelings of anxiety	9
Household family relationships	family and community ties	11
individuals perceptions of food insecurity risk	Perceptions of nutrition	3
income from coffee	farming profitability	1
children school attendance	school attendance	4
empowerment	empowerment	8
coffee income	farming profitability	1
access to skills and training (human cap)	Human capital asset	12
access to credit (financial cap)	Financial capital asset	12
social cohesion (social cap)	Social capital asset	12
access to equipment and machinery (physical cap)	Physical capital asset	12
access to land (natural cap)	Natural capital asset	12
coffee net cash income	farming profitability	1
social recognition and appreciation	social recognition and appreciation	6
cultural identity	cultural identity	7
household and community social reciprocity	family and community ties	11
exchange of knowledge (human and social cap)	human capital asset	12
coffee prices gained	farming profitability	1
traditional farming identity	cultural identity	7
Income	household income	1
Risk perceptions	perceptions of environmental risk	10
perceptions of income	farming profitability; household income	1
women empowerment	empowerment	8
non-farm income generating opportunities for women	women's income	1
perception of income generation	household income	1
cultural and indigenous identity	cultural identity	7
feelings of fear (perceptions)	feelings of fear	9
Gender asset gap	Gender asset gap	12
farmer income (descriptive perceptions)	farming profitability	1
perceptions of nutrition	Perceptions of nutrition	3
employment	employment	8
wildlife crops damage	wildlife crops damage	10
prices for coffee gained	farming profitability	1
food production	food security	3
gross added value	farming profitability	1
perceptions of food security	Perceptions of nutrition	3
perceived change in skills (human cap)	human capital asset	12
perceived change in social networks (social cap)	Social capital asset	12
perceived change in financial benefits (undefined)(financial cap)	financial capital asset	12
coffee revenue	farming profitability	1
access to finance and loans	financial capital asset	12
empowerment	empowerment	8
change in skills and abilities (human cap)	human capital asset	12
living wage	wages	1
perceived ability to feed household	Perceptions of nutrition	3
children school attendance	school attendance	4
housing	housing	5
secure land ownership	land tenure security	9
social cohesion and trust (social cap)	Social capital asset	12
skills and training (human cap)	human capital asset	12
farm inputs (physical cap)	Physical capital asset	12
agency and empowerment	empowerment	8
farming equipment (physical cap)	Physical capital asset	12
training and knowledge (human cap)	human capital asset	12
access to credit (financial cap)	financial capital asset	12
household income	household income	1

coffee income	farming profitability	1
children's education	years of schooling	4
skills and education (human cap)	human capital asset	12
farming equipment and infrastructure (physical cap)	Physical capital asset	12
access to loans, debt (financial cap)	financial capital asset	12
coffee profit as a function of prices, gross income and production costs	farming profitability	1
skills (human cap)	human capital asset	12
access to equipment (physical cap)	Physical capital asset	12
individual perceptions	farming profitability	1
individual perceptions	farming profitability	1
individual perceptions	farming profitability	1
number of daily meals	food consumption measure	3
school attendance	School attendance	4
children's schooling attainment	School attendance	4
access to healthcare	Access to healthcare	2
children's education	years of schooling	4
cooking fuel/equipment, electricity, sanitation	electricity; cooking fuel; sanitation	5
training and knowledge (human cap)	human capital asset	12
savings (financial cap)	financial capital asset	12
food supply	food security	3
school attendance	School attendance	4
housing	housing	5
nutrition status; child stunting	Perceptions of nutrition	3