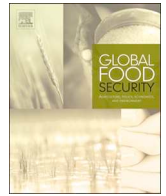




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The Missing Middle: Connected action on agriculture and nutrition across global, national and local levels to achieve Sustainable Development Goal 2

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ABSTRACT

Sustainable development goal 2 (SDG 2) challenges the world to connect food production and consumption in a way that matches local contexts and enables everyone to enjoy a healthy diet that is produced sustainably and contributes to the other SDGs. We identify a Missing Middle between food production and consumption, and between globally defined goals and local implementation practices that may hinder progress towards SDG 2. Examples of this Missing Middle and how it can be bridged demonstrate that key challenges should be addressed in a more integrated manner for more effective action on SDG 2. We encourage actors in food provisioning to start addressing the Missing Middle by collaborating with relevant stakeholders in specified cases.

1. Introduction

The 17 Sustainable Development Goals (SDGs) that were adopted by world leaders in 2015 offer a global agenda towards 2030. The aim of SDG 2 (Zero Hunger) is to ‘end hunger, achieve food security and improved nutrition and promote sustainable agriculture’ (United Nations, 2015). Currently, however, the world is not on track to achieve SDG 2 by 2030. Approximately 821 million people are undernourished (FAO, 2019), 2 billion people lack essential micronutrients such as vitamin A and iron, and 2 billion people are overweight or obese (Development Initiatives, 2017). At the same time agriculture, needed to feed these people, contributes to 10–12% of man-made greenhouse gas emissions (Smith et al., 2014) and to 70% of freshwater withdrawals (Foley et al., 2011), while a third of all food produced is wasted along the value chain (Alexander et al., 2017; Gustavsson et al., 2011). These challenges need to be addressed and require different approaches than those currently applied.

SDG 2 is operationalized by eight targets. SDG targets 2.1 and 2.2 address micro- and macronutrient deficiencies but not overconsumption or the consumption of foods high in salt, fat and sugars, and subsequent health problems such as diabetes and cardiovascular disease. SDG 2.3 proposes a doubling of agricultural productivity and incomes for small-scale farmers, which is highly relevant but overlooks

that also larger-scale farmers can earn relatively low incomes from farming. SDG 2.4 calls for more sustainable agriculture without clarifying what sustainable agriculture entails exactly. The latter four targets of SDG 2 concern means of implementation (i.e. genetic diversity, agricultural investments, trade and markets) that contribute to the achievement of the first four targets of SDG 2.

Taken together, the eight targets of SDG 2 overlook the importance of value chains and food systems. Value chains connect the agriculture and nutrition aspects of SDG 2 through the actors, activities and resources involved in the production and distribution of a food product from primary production up to the final consumption of the product. Value chains, however, cannot be viewed in isolation. They are part of wider food systems where these value chains interact with each other (Leonardo et al., 2015; Van Zanten et al., 2018) and with other components of food systems. In the HLPE definition, “a food system gathers all the elements (environment, people, inputs, processes, infrastructures, institutions, etc.) and activities that relate to the production, processing, distribution, preparation and consumption of food and the outputs of these activities, including socio-economic and environmental outcomes (HLPE, 2017: 29).”

The targets of SDG 2 are accompanied by 14 indicators to monitor progress over time. These indicators are national-level indicators, although the use of data disaggregated per region and for certain

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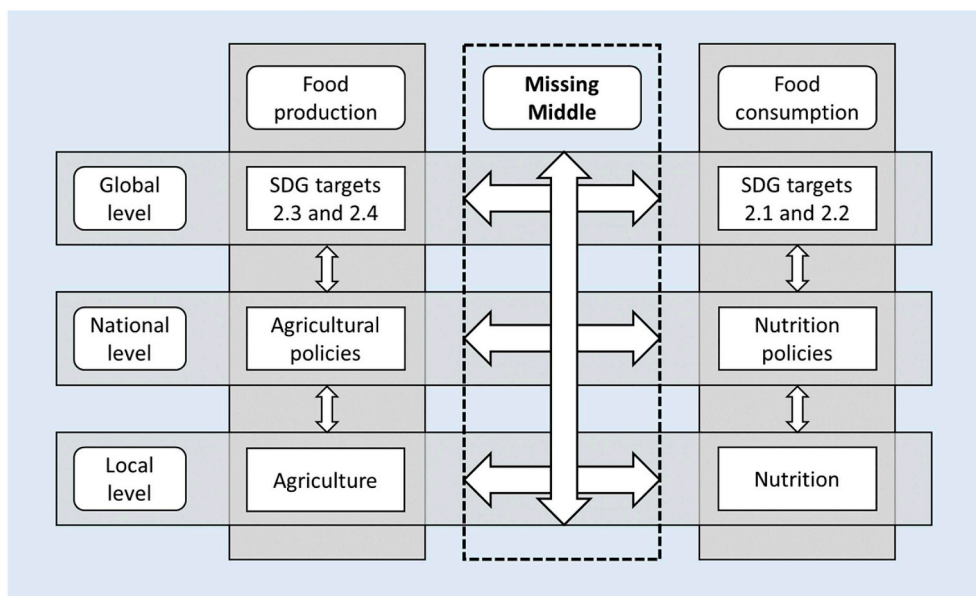


Fig. 1. Representation of the Missing middle in SDG 2.

segments of the population is encouraged (United Nations, 2015). One concern with using these indicators for SDG monitoring is that they are directly related to the SDG targets, which means that they perpetuate the aforementioned issues with these targets. Another concern is that a substantial number of indicators currently used for SDG monitoring are pre-existing indicators. These indicators have not been developed specifically for the SDGs and hence may not necessarily capture the information required to monitor the SDGs over time. Moreover, these indicators are not suited to capture the interconnected nature of the SDGs. This means that critical information to manage trade-offs and benefits from synergies may be overlooked.

Applying a food systems lens to SDG 2 means that the targets and indicators of SDG 2 should not be addressed in isolation but in connection. A shift from grain monocultures to more diverse production systems, for example, does not necessarily result in improved food security and nutrition when farmers sell most of their produce, when such foods get lost along the value chain (Alexander et al., 2017; Gustavsson et al., 2011) or when demand for highly processed foods remains high. Likewise, a change in food demand can only result in improved food and nutrition security when such foods are available, when all consumers have access to such nutrient-dense foods (Heady and Alderman, 2019) and when nutrients from these foods can be absorbed in the body (FAO, 2008). Without connected action, the diverse components of nutritious diets may be produced in highly unsustainable ways. Hence, SDG 2 can only be achieved when agriculture and food and nutrition security (and related aspects such as health care) are addressed in connection.

In this paper, we introduce the Missing Middle to signify that a lack of connected or coordinated action from food production to consumption at all levels hinders progress on SDG 2. In the remainder of this paper, we will elaborate on this Missing Middle, highlight a number of examples to illustrate the concept further and offer strategies to bridge the Missing Middle.

2. The Missing Middle in SDG 2

Over the last decades, our food systems have become more globalized, specialized and complex due to advancements such as cooled transport which have reduced transport costs (Palpacuer and Tozanli, 2008), improved communication technology and reduced trade barriers. As a result, the consumption of food in globalized food systems

has become more and more distanced from its production (Princen, 2002). Consequently, consumer decisions (especially in urban areas and in developed countries) are commonly made in disconnect from the environmental and social impacts that are incurred elsewhere when producing food (Boström et al., 2015; Princen, 2002; Swisher et al., 2018). Similarly, production decisions and other decisions in value chains are often made in relative isolation, focusing on e.g. high yields, production volumes or gross margins and not necessarily on the nutritional value or sustainability impacts of food production and consumption.

Globalized food systems are characterized by a larger number of actors than in 'traditional' food systems. These actors are not only horizontally distanced from each other as described above but also vertically. A cocoa producer in Ivory Coast, for example, knows the trader who buys the beans, but probably not the exporter, processor, confectionary producer, distribution centre, retailer or consumer who subsequently handle the beans in various countries. This larger number of actors, locations, activities and related impact makes it difficult for any single actor (including powerful brands and retailers; IPES-Food, 2017) in these value chains to change their course. In addition, governments struggle to govern these value chains since the principle of national sovereignty means that governments can only govern within their national borders and have little transnational steering capacity. Although there are bodies and conventions for international governance, these are often voluntary and/or topical (e.g. SDGs, convention on biodiversity, universal declaration of human rights, ILO), which hinders their effectiveness.

This disconnect between food producers and consumers at various levels of globalized food systems (local, national, transnational) is what we call the Missing Middle. This Missing Middle hinders SDG 2 implementation because it has limited the sphere of influence of single actors, disabling them to address their joint impacts on the environment, people, economy etc. even though these impacts can have severe consequences (e.g. climate change, deforestation). Every actor in the food system has a role to play in achieving SDG 2 and only when their actions are aligned can SDG 2 be achieved. This means that SDG 2 needs to be achieved at global, national and local levels (i.e. community, household and individual level), which are interconnected. For example, low profitability of a farm can be the result of an interplay of factors at these different levels such as a lack of access to input markets, low market prices or changes in weather patterns due to climate

change.

Fig. 1 shows a simplified representation of the two intersecting axes of the Missing Middle in SDG 2, i.e. the global–local axis and the food production–consumption axis. These two axes relate to the distancing between global and local levels, and between producers and consumers of food, respectively. In the following two subsections, we will use these two axes to elaborate what this Missing Middle means for SDG 2 implementation.

2.1. Food production-consumption axis of the Missing Middle

SDG 2 focuses on agriculture and nutrition, but not on the value chains or wider food systems that connect agricultural production to consumption (Fig. 1). This predominant focus on agriculture and nutrition aligns with what Reardon (2015) labelled the ‘hidden middle’, i.e. the midstream in agrifood value chains (i.e. processing, storage, transport and retail). The midstream in agrifood value chains is highly relevant to consider in addition to agricultural production and consumption for achieving SDG 2. For example, this midstream is responsible for 30–40% of economic value added in food value chains in developing countries (Reardon, 2015), and greatly affects nutritional quality of food (Reddy and Love, 1999; Salunkhe et al., 1991), food waste (Alexander et al., 2017; Gustavsson et al., 2011) and access to food (Beaulac et al., 2009; Misselhorn, 2005). Achieving SDG 2 depends on each component of the food system, and on the way food systems are organized with multiple actors managing multiple linked and nested value chains within dynamic and interactive food environments.

2.2. Global-local axis of the Missing Middle

The global–local axis of the Missing Middle means that SDG 2 needs to be localized to bridge the distance between global and local levels. Localization involves determining (sub-)national goals and pathways that simultaneously contribute to global achievement of the SDGs and take into account local priorities, challenges and opportunities. One of the challenges herein is that the contribution of such goals and pathways to global achievement of SDG 2 cannot easily be established. Agenda 2030 encourages all countries to regularly submit Voluntary National Reviews (VNRs) to the High-Level Political Forum. This process is reminiscent of submitting Intended Nationally Defined Contributions (INDCs) to the United Nations Framework Convention on Climate Change (i.e. Paris Agreement). These INDCs outline countries’ intended reductions in greenhouse gas emissions, which together can be used to determine whether the goal of staying below 2 °C global warming is likely to be achieved or not. VNRs, however, do not contain similar targets that can be checked against the SDGs, which hinders ensuring that combined (sub-)national targets and SDG implementation contribute to the global achievement of SDG 2.

Another challenge in localizing SDG 2 is that the numerous relevant stakeholders involved in food systems have widely varying perspectives on local challenges, priorities and opportunities, and act accordingly. At present, governments (UN DESA, 2016; 2017), the private sector (Business & Sustainable Development Commission, 2017; GRI et al., 2015; UN Global Compact, 2012), knowledge institutions (SDSN Australia/Pacific, 2017; Sustainable Development Solutions Network - Youth, 2017), civil society organisations (Action for Sustainable Development, 2016; Munro, 2018) and other stakeholders have all started localizing and implementing SDG 2. Although there may be some coordination among these stakeholder initiatives, a lack of cooperation and coordination may result in inefficient or even counter-productive SDG 2 implementation.

Hence, localization requires the coordination of pathways to achieve SDG 2 at multiple levels (e.g. individual, community, country and global level) and endpoints (e.g. sustainable agriculture, human health and equity).

3. Examples of the Missing Middle

In the previous Section, we introduced the Missing Middle in quite general terms. In this Section we present more specific examples of the Missing Middle in government, the private sector, consumers and research. More knowledge-sharing and coordination among these stakeholder groups is required to bridge the Missing Middle. In the following, we will discuss these four examples of the Missing Middle and illustrate how it is or can be overcome.

The first example concerns governments. In many countries, policies on agriculture are prepared by the Ministry of Agriculture, whereas policies on nutrition are prepared by the Ministry of Health. In addition, countries commonly have several tiers of government, e.g. national, subnational and local governments. In this example, the Missing Middle concerns a lack of coordination between those responsible for agriculture and nutrition policies (Fresco and Poppe, 2016). As a result, agriculture and nutrition policies within and among the various tiers of government push and pull stakeholders in multiple directions that may not always lead to more sustainable outcomes.

Several governments have formed interministerial working groups for the SDGs. One of the aims of these working groups is to ensure better policy alignment, which helps to overcome the Missing Middle. A national roadmap towards the SDGs would also contribute as this ensures ex-ante rather than ex-post alignment of policies. Moreover, a national roadmap would help local governments align their policies with national policies and across localities. Structures for cooperation within and among local levels, within and among national levels, and between local and national levels will be essential to make such roadmaps work. Such cooperation and involvement should not only occur in the implementation of these roadmaps, but also in their design.

The second example concerns the private sector. As outlined in the previous Section, reduced trade barriers, technological advancements and other developments have distanced the increasing number of actors in food value chains across the globe. The Missing Middle in this example concerns the disconnect between companies at various levels in food value chains, which has limited the ability of these companies to effectively address their impacts on e.g. climate change and unhealthy diets.

Large brands and retailers have more power in food value chains than many other actors (IPES-Food, 2017). Some of these companies use this power for better coordination of sustainability impacts along the value chain (e.g. Bhattacharya and Polman, 2016). Such companies, however, are challenged by the large complexity of food value chains (e.g. it can be highly challenging to ban child labour from your value chains when you cannot trace your product back to its original producers) and the large number of chains they are commonly involved in.

A development that may contribute to overcoming the Missing Middle in the private sector is the formation of farmer and similar organisations. Such organisations (if they function well) have more bargaining power (e.g. for better prices and more access to inputs) than individual farmers and can act as a more equal partner of larger companies in the value chain (e.g. working together for more impact on e.g. climate through mutual learning and joint action).

The third example concerns consumers, in particular consumers in urban areas and in developed countries. The Missing Middle in this example concerns the disconnect between the choices that consumers make and the impacts of these choices on e.g. international public goods such as land use and greenhouse gases in the atmosphere. On the production-consumption axis, consumer choices impact agriculture, and the related food value chains and actors therein (e.g. farmers and input suppliers). Consumer choices also influence consumers’ nutritional and health status, which affects health systems. Consumers, however, make many daily consumptive decisions without considering the consequences of these decisions on resources, food system outcomes at various levels nor the consequences for their own health (O’Rourke and Ringer, 2016).

A growing group of consumers in urban areas and developed countries is changing their consumption pattern in an effort to improve the impact of their consumption on producers, environment and/or human health. Some of these consumers switch to purchasing locally produced food to shorten value chains and to better understand how and where the product was produced. Other consumers switch to certified and labelled products, resulting in a growing market share for such products (Fairtrade International, 2016, 2017; MSC, 2017). One challenge for such labelling and certification schemes is to balance sustainability ambitions with inclusiveness (Bush et al., 2013). Perhaps more importantly, however, is how all consumers can be stimulated to switch to more sustainable consumption patterns. Simply providing more information does not automatically lead to behavioural change due to e.g. scepticism and habitual consumption (O'Rourke and Ringer, 2016). However, recent literature points to the additional role that nudging could play in specific settings, although more research is needed to validate results across different contexts (Lehner et al., 2016). Recently, research on addressing everyday consumption practices has generated innovative strategies to engage consumers in moving towards more sustainable food systems (PBL, 2019; Warde et al., 2017). Government interventions such as quality standards, taxes and subsidies can play an important role as well.

The fourth example of the Missing Middle concerns the research community. Here a Missing Middle occurs not only when results are not shared across disciplines, but also when results are not shared (in an appropriate way) with relevant actors within society who ultimately need to implement these insights to make change happen. Therefore, interdisciplinary science (or transdisciplinary science) is important to study increasingly complex phenomena and questions. The challenge in that is to bridge differences in research questions, units of analysis, methodology etc. A similar challenge these researchers face is the dichotomy between global or national-level studies and local-level studies. The former category of studies commonly uses models that offer insights in complex processes at various scales and time periods, but inevitably require a degree of simplification. Local-level studies are generally detailed case studies that offer insights in local drivers and individual decision-making processes. The difficulty in combining such approaches is that global-level studies cannot account for the diversity of drivers and outcomes at the local level, whereas local-level studies cannot simply be generalized to the global level (Van Wijk, 2014). Hence, scientists need to build across various methodological constraints to bridge the Missing Middle in SDG 2 through more holistic research.

There are many examples of interdisciplinary research and we would like to highlight an example that is highly relevant for SDG 2 to demonstrate the importance of collaboration among disciplines. This example concerns research that was conducted in Burkina Faso and Benin where phosphorus fertiliser was found to increase sorghum yield but also phytic acid in the grain. Phytic acid prohibits absorption of Fe and Zn in the human body, aggravating micronutrient deficiency. Fortunately, grains could easily be processed locally in such a way that phytic acid was degraded before consumption (Slingerland et al., 2006). In the same research programme, a change of rice production systems in China from flooded to intermittent irrigation to save scarce water resources was successful in maintaining yields, but Zn uptake by rice was seriously decreased. To maintain Zn levels in people's diets either Zn fertilisation of rice fields or Zn fortification of rice flour was needed (Slingerland et al., 2009). In this research programme, the trade-offs between quantity and quality were only identified because agronomists, soil scientists, food processors and nutritionists worked together towards a common goal. The results of this research programme were later included in the global programme on breeding for micronutrients (www.harvestplus.org) where anti-nutritional factors such as phytic acid and polyphenols were controlled alongside the progress in desired traits (enhanced yield, Zn and Fe content) to assure the bioavailability of the micronutrients.

4. Bridging the Missing Middle in SDG 2

The examples in the previous Section demonstrate that various approaches can contribute to bridging the Missing Middle, e.g. alignment of activities, increased cooperation and coordination, formation of interest groups, changes in consumption choices, interdisciplinary and transdisciplinary approaches, systems thinking, working in partnership, and continuous exchange and dialogue. We argue here that what is additionally needed is the development of joint pathways that outline coordinated steps that stakeholders take to jointly contribute to SDG 2. There are five steps in developing such pathways: stakeholder analysis and involvement, envisioning the desirable future, exploring potential pathways towards this future, checking whether these pathways will result in the desired future, and extracting and aligning stakeholder action plans based on the joint pathways.

A first and crucial step in this process is performing a stakeholder analysis and getting the right people at the table. This process starts with a clearly defined case, i.e. what is the main objective, what are the system boundaries, what are the main processes and activities involved etc. This case description forms the basis of the stakeholder selection, i.e. who are the main stakeholders based on their interest and influence (their stake) in the case at hand. Although organisations are often listed as a stakeholder, it is important to identify the right people within these organisations. Ideally these would be committed people who can influence the activities of these organisations (to ensure that outcomes are implemented).

The second step in this process is to get the stakeholders together and to jointly discuss a desirable future for the case considered. Two approaches may be taken in discussing a desirable future, or a mix of the two, i.e. to forecast current trends and think of changes to that future, or dreaming up a future independent of the current state. The former may be preferred as it explicitly takes into account the current situation and potential lock-ins that may persist, while the latter may be preferred as it could result in more innovative pathways. Two recent reports can contribute to this process as they outline what a healthy diet within planetary boundaries constitutes (Willett et al., 2019) and what targets with respect to SDG 2 and related SDGs we should aim for (FABLE, 2019). In case there is no consensus on the desired future, a limited number of futures may be explored to see later on in the process which is more desirable based on the pathways towards these futures.

Once a desirable future has been defined, stakeholders should determine how their case currently contributes to the SDGs, which serves as starting point for the pathways. Once this starting point and the end point (desirable future) are clear, stakeholders can back-cast from the desired future towards the present. This backcasting will clarify which steps are needed along the way to move from the present to the desirable future (Quist and Vergragt, 2006; Kanter et al., 2016). There are likely various routes that stakeholders can take towards their desirable future, e.g. incremental changes across the board, radical change in one or a few aspects, an innovation-driven pathway, a pathway through knowledge sharing etc. The pathway defined ultimately depends on the preferences, capabilities and opportunities of the stakeholders involved.

The fourth step is to explore whether the pathway results in the desirable future that was defined. This step is commonly done through modelling (Kanter et al., 2016), even though such models are usually stronger in modelling the bioeconomic than in modelling the socio-cultural aspects of the pathways. Therefore, it is important that a monitoring framework (and subsequent adaptation cycles) is developed for the implementation phase of the pathway. The current SDG indicators may be used for this, although additional indicators should be used as well (Gil et al., 2019). An alternative approach to this step and the previous step could be that scientists rather than stakeholders develop the pathway. Such a top-down approach, however, may result in lacking ownership, which limits the implementation of the pathway. On the other hand, such scientifically developed pathways could offer a helpful starting point for the discussions on pathways (although there is

a risk that this steers the discussions).

Finally, once the desirable pathway has been developed and checked, all stakeholders involved should extract their action plans based on this joint pathway. Since it may prove challenging to determine what individual actions add up to the pathway outlined, scientists could contribute to this step by developing a tool similar to the linker tool for countries in the FABLE project (FABLE, 2019). When this is not possible (for example due to time and budget constraints), stakeholders should design individual action plans to the best of their capabilities and acknowledge that many changes in a similar direction will be made that will have a positive impact on the SDGs.

5. Conclusion and recommendations

Ensuring universal access to healthy food that is sustainably produced is central to achieving SDG 2 and related SDGs. We identified an important Missing Middle between food production and consumption, and between globally defined goals and local implementation practices that needs to be recognized and addressed in order to achieve this goal. As we have illustrated, this Missing Middle is being addressed in cases which can serve as a basis for further action. These examples illustrate that key challenges in sustainable and healthy food provisioning must be addressed in a more integrated manner to be effective. Joint pathways can be developed to determine which actions by individual stakeholders combined contribute to their desired future. To prevent further complexity in food governance, this process could start by engaging the relevant stakeholders in specific cases that have the capacity (power and legitimacy) to realize the necessary changes in a transparent manner. Achieving SDG 2 requires bridging the Missing Middle, and experiences and building blocks are available to begin this important task.

Declaration of competing interest

None.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.gfs.2019.100336>.

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