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Sustainable Development Goals (SDGs) and their implementation

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Title: Sustainable Development Goals (SDGs), and their implementation

Sub title? A national global framework for health, development and equity needs a systems approach at every level.

Comment [S1]: Sub-title may be redunddant

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Keywords:

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Abstract

The Sustainable Development Goals (SDGs) are a set of global goals for fair and sustainable health at every level: from planetary biosphere to local community. This bold new global agenda to end poverty by 2030 and pursue a sustainable future was unanimously adopted ~~today~~ by the 193 Member States of the United Nations in 2015. The framework aims to end poverty, protect all that makes the planet habitable, and ensure that all people enjoy peace and prosperity, now and in the future. Although the goals represent a well consulted framework that is scientifically robust, and widely intuitive, there is much to be done if they are to build upon the progress established by the Millennium Development

Comment [S2]: Both reviewers highlighted that the word today was redundant and inaccurate

Goals (MDGs). There is empirical evidence that many countries have yet to understand the difference between the MDGs and the SDGs – particularly their universality, the huge potential of new data methods to help with their implementation, and the systems thinking that is needed to deliver the vision. The UN describe this as 'system wide strategic planning' to 'integrate the economic, social and environmental dimensions into policy and actions'; more simply it means looking at the impact of any action across all 17 Goals. (200~~163~~ words)

Comment [S3]: Added at request of Reviewer 1

Introduction

The Sustainable Development Goals (SDGs), otherwise known as the Global Goals, are a set of objectives within a universal agreement to end poverty, protect all that makes the planet habitable, and ensure that all people enjoy peace and prosperity, now and in the future. The Goals were adopted by all member states of United Nations formally in 2015, for the period 2016~~5~~-2030 to address the overwhelming empirical and scientific evidence that the world needs a radically more sustainable approach. The goals provide a well consulted framework that is sufficiently scientifically robust, politically acceptable, and publicly intuitive. The goals provide us with our best chance of ensuring the necessary collaboration and alignment as we implement global approaches to securing a fair, healthy and prosperous future for ourselves, our children and grandchildren. Although the 17 goals (Table 1) are supported by targets and indicators (see Table 2 for those associated, for example, with Goal 2) the key learning is that all the goals are intimately interconnected – a failure to appreciate this will perpetuate an approach which will be non-aligned at best and highly ineffective at worst. Secondly, despite the intuitive nature of interventions that deliver both immediate and long term "co-benefits" (such as sustainable transport and food systems, or

Comment [S4]: The SDGs were to begin in 2016

better access to green space), there is a worrying lack of generalisable, quantifiable evidence on the levels of benefit that appeals to policy makers, scientists, or practitioners. This inhibits our vision and courage to act in those areas where we should be more specific about health, social and economic benefits. At a global level, we should use the SDGs to highlight the inter-linkage between goals and champion the specific and collaborative actions that create multiple and beneficial outcomes for shared purpose.

The Sustainable Development Goals (adopted by the United Nations General Assembly in September 2015) run from 2016 to 2030 and are formally the goals of the United Nations' 'Transforming our world; the 2030 Agenda for Sustainable Development', an agenda which sets out the vision, principles and commitments to a fairer and more sustainable world for all. The practical and political importance of the SDGs, and the challenges associated with them, can only truly be appreciated by understanding what preceded them. The Millennium Development Goals (MDGs) were in place from 2000 to 2015 and consisted of 8 international development goals. The first three goals covered poverty, education and gender equality; the next three goals addressed 'health outcomes' covering child mortality, maternal health and 'HIV/AIDS, malaria and other diseases'. The remaining two goals addressed environmental sustainability and global partnership for development. These 8 MDGs were supported by a total of 21 individual targets.

Comment [S5]: Added for clarity

The MDGs, although a move in the right direction, were subject to certain criticisms. One was that there was insufficient analysis to justify why these goals were selected as priorities and insufficient information available to be able to compare performance, especially in tackling inequalities within countries[1]. This highlighted the perennial challenge in such initiatives of balancing political consensus with scientific validity. Nevertheless, based on data compiled by the Inter-Agency and Expert Group on MDG indicators[2], the UN could demonstrate considerable success on some goals, especially on reducing extreme poverty (numbers of people living on less than $1.25 per day), reducing both child and maternal

mortality, increasing access for people living with HIV to antiretroviral treatment and reducing new HIV infections. However, the report recognised that *'progress has been uneven across regions and countries'* in the implementation of the MDGs.

Perhaps most importantly, the Millennium Development Goals focussed primarily on the needs of developing countries reinforcing a binary view of rich and poorer countries, of donors and recipients and implying that the global challenge is a problem of development which international aid can help address, rather than a set of shared problems which only collective action globally can resolve.

In contrast to the MDGs, the SDGs are both broader in scope, more collective in action, and more detailed in content, including a clear message that every nation must act if success is to be realised[3]. The UN has summarised the difference between the two approaches as follows:

- The 17 Sustainable Development Goals (SDGs) with 169 targets are broader in scope and go further than the MDGs by addressing the root causes of poverty and the universal need for development that works for all people. The goals cover the three dimensions of sustainable development: economic growth, social inclusion and environmental protection.
- Building on the success and momentum of the MDGs, the new global goals cover more ground, with ambitions to address inequalities, economic growth, decent jobs, cities and human settlements, industrialization, oceans, ecosystems, energy, climate change, sustainable consumption and production, peace and justice.
- The new Goals are universal and apply to all countries, whereas the MDGs were intended for action in developing countries only.

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- A core feature of the SDGs is their strong focus on means of implementation: the mobilization of financial resources; capacity-building and technology; as well as data and institutions.
- The new Goals recognize that tackling climate change is essential for sustainable development and poverty eradication. SDG 13 aims to promote urgent action to combat climate change and its impacts.

The UN resolution refers to five 'areas of critical importance'; sometimes known as the 5 'P's, these are People, Planet, Prosperity, Peace and Partnerships~~.~~ (See Table 1). The goals were launched with the strap-line of 'Ensuring that no-one is left behind' with its implication that development and levelling up will be the keys to progress by 2030. How this aspiration is reconciled with maintaining ecosystems and tackling climate change will be a challenge in itself. However, the SDGs do have a clear goal on climate action (goal 13), which has been strengthened subsequently by the Paris A~~a~~greement of the 21st Conference of Parties (COP21) to the United Nations Framework Convention on Climate Change (UNFCCC). However, the SDGs are voluntary commitments by governments in contrast to the formal Paris A~~a~~greement ~~made by the COP21 process~~ which is legally binding now that it has been signed by 55% of parties and that those who have signed are responsible for more than 55% of greenhouse gas emissions. Also adopted in March 2015, and with a similar timescale, was the Sendai Framework for Disaster Risk Reduction (2015-2030) which succeeded the Hyogo Framework for Action (2005-2015); the Sendai Framework was agreed by 187 countries and was endorsed by the UN General Assembly in June 2015.

Sources of data

Comment [S6]: This section is re-produced from the UN website on Sustainable Development. It includes American English spelling e.g. industrialization, mobilization, recognize… I haven't edited these.

Comment [S7]: As suggested by Reviewer 1.

Comment [S8]: Added at suggestion of reviewer 2
No formal reference is included here although the document can be found at http://www.unisdr.org/files/43291_sendaiframeworkfordrren.pdf
Also see later comment on reference numbers

There is a wealth of published material on sustainable development in general and on the SDGs in particular from the UN, from international non-governmental organisations, and from many other concerned and committed organisations and individuals more locally. It is easy to get lost in all of this so we have been selective in the sources we have used. Most importantly, there is a widely held view that much more innovative ways to both collecting data and using data, from crowd sourcing to the use of big data, need to be used if the mechanism for implementing and delivering the SDGs are to take full advantage of the data revolution.5

Comment [S9]: Reference 5 appears before Reference 4. These should be reversed but I am unable to delete the existing numbers.

~~Firstly, t~~There is a dedicated United Nations website on sustainable development (http://www.un.org/sustainabledevelopment/) as well as a sustainable development knowledge platform (https://sustainabledevelopment.un.org/) with updates on the High Level Political Forum, on individual topics and milestones, and a directory of resources including recent publications. Both sites have much supporting material on the SDGs and also on the challenge of integrating the three dimensions of sustainable development (economic, social and environmental).

Comment [S10]: This 'Firstly' had become redundant.

The formal resolution adopted by the UN General Assembly in September 2015 was published on 21 October 2015[3]. In the same year the United Nations Statistical Commission created an Inter Agency and Expert Group on SDG Indicators (IAEG-SDGs), which will coordinate proposals of a global indicator framework.[4] This should be properly recognised by all countries and associated organisations who are working towards consistent methods of tracking progress so that duplication can be avoided, gaps identified, and resources directed most effectively. While work continues on international action to support the SDGs, all countries are 'expected to take ownership and establish a national framework for achieving the 17 goals'. The UN states that countries have the 'primary responsibility for follow-up and review' and this 'will require quality, accessible and timely data collection'. In

the UK, for example, the Office for National Statistics (ONS), has been working with the UK Stakeholders for Sustainable Development (UKSSD) to consult on national indicators for the SDGs. And some countries (notably Sweden, Germany, Colombia, the Philippines, and Czechia) already have national institutional arrangements.[5]

Areas of agreement

There is general agreement on the breadth and depth of the goals. There are clear obligations and responsibilities for all member states (for which they will be held to account) and a recognition that cross systems approaches to implementation will be needed. This is a significant change from the MDG process and requires explicit contributions from every country, particularly in developing and aligning the complex analytical tools to assess progress and assist decision making. The UN report on 'critical milestones'[6] refers to 'an overarching vision and framework'. Getting accountability structures fit for purpose is already a key challenge[7]. A recent review in Nature[8] identifies that this requires a 'new coherent way of thinking' and that while it is implicit in the SDG logic that the goals depend on each other, no-one has specified exactly how. To help, different models have been developed[9], including both scenario analysis and quantitative modelling. Some of these can be used as top-down macro-framework level tools and some as sectoral models for option level impact analysis. This independent review7 of 16 countries who volunteered for national review (by the High Level Political Forum) noted a range of different approaches to deal with the complexity of the implementation process. Some countries with existing national sustainable development strategies have built on these and tried to align existing objectives with the new goals. Other countries have developed new national SDG Implementation Plans. Some have linked the SDGs to financial planning for sustainable development or sought to integrate SDGs either in sectoral planning (nutrition, education etc) or in local government planning frameworks.

Comment [S11]: Changes in lines 192 & 197 and In response to the reviewers' request for greater clarity.

Other areas of agreement include the need to integrate the three dimensions of sustainable development (economic, social and environmental)[10 11], the importance of raising awareness and creating ownership and the need for stakeholder engagement 7[8]. This is especially important to address the widespread misbelief that sustainable development concerns only the environmental dimension and conflicts with necessary "economic growth". No strategy, not even one agreed by all member states of the United Nations, can immediately address historical cultures; yet, it remains one of the most fundamental challenges (and opportunities) for us all to address. The reality is that addressing all three dimensions collaboratively will yield the greatest benefits, whilst the alternative - addressing them separately and in competitive isolation - will deliver much less and with greater risks.

The agreement on the need for 'systems thinking', and integration across the three dimensions, is welcome, but the difficulties inherent in this approach should not be under-estimated. This has been illustrated by recent worked examples and case studies.

One worked example[8] concludes that action on the route to zero hunger in sub-Saharan Africa interacts positively with Goal 1 (poverty), goal 3 (health and wellbeing), and goal 4 (quality education). However, it also notes that food production has a more complex interaction with goal 13 (climate change mitigation). This is because agriculture contributes 20-35% of global greenhouse gases, so climate mitigation constrains some types of food production (particularly meat). Additionally, food production (goal 2) can compete with renewable energy production (goal 7) and eco-system protection (goals 14 and 15). Conversely, climate stability (goal 13) and preventing ocean acidification (goal 14) will support sustainable food production and fisheries (Goal 2).

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Similarly, the UN paper on mainstreaming the three dimensions[11,11] highlights water as a nexus of integration and describes how water and sanitation (Goal 6) underpin other areas such as health (Goal 3), food (Goal 2), energy (Goal 7), elimination of poverty (Goal 1), economic productivity (Goal 8), equity (Goal 10) and access to education (Goal 4).

Areas of controversy

Perhaps the biggest single controversy, particularly because simplicity and logic favour collaborative and system wide implementation, is the high number of goals, targets and supporting actions that have been agreed. This raises concerns about whether governments and international agencies have sufficient skills in 'whole systems thinking'[12] to implement the goals without the risk of 'unintended consequences' and 'perverse outcomes'8. Early mapping exercises 8,[11,11, 12.] have demonstrated the important interconnections between achieving goals but experience suggests that government departments and international negotiations do not always have the mandate or skills to realistically address what might at first appear to be inconvenient and politically contentious trade-offs8 and unintended consequences.

Deciding which goals to prioritise and then assessing the positive (or negative impacts) on other goals, is a crucial step. There is scope for concern if governments, corporations or agencies were to prioritise energy production (to meet goal 7), agricultural output (to meet goal 2) or development of business and infrastructure (to meet goals 8 and 9), without considering impacts on climate (goal 13), water (goal 14) or land (goal 15). The root cause of this problem is the failure to imagine better ways of addressing energy, agricultural output, and what defines success of a business in the 21st century. It is rarely more of what has gone before. The SDGs are the formal stimulus for us to innovate collectively at scale and

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pace; and to think and act better not bigger. For instance, we need to be more open to the increasing evidence of the many potential positive interactions between different goals. More equitable and sustainable food systems would help to meet goal 2, produce ecological benefits (goals 13-15) and help tackle problems such as obesity and non-communicable disease (goal 3)8[12~~12~~].

Interestingly, although the SDGs and supporting targets make little mention of tackling world population growth, there are several studies illustrating how co-ordinated, whole system approaches to the SDGs are already stabilising the global population. One paper[13] looks at how the SDG targets on mortality, reproductive health and education for girls will directly and indirectly influence future demographic trends. Another paper[14], looking from the opposite perspective, describes how reductions in fertility in Africa could reduce dependency ratios (the proportion of population not economically active) and thus help tackle poverty (goal 1), increase productivity (goal 8), and improve education and gender equality (goals 4 and 5).

It should be clear that each country will pursue these Global Goals differently, and that a key a benefit of the SDG approach is ~~that gives~~ a degree of local flexibility. However, there are certain goals which require urgent collective action, where the clock is ticking on the world's ability to tackle changes that are already significantly impacting on planetary health.[15] This means that international collaboration must give primacy to action on climate change (goal 13) and the need to make economic policy subservient to the minimisation of environmental impact (see goal 12: Responsible consumption and production). This is of increasing importance with the recent expressions of electoral judgements in some western countries. The danger is that electorates are seduced into abandoning collective responsibility for the three dimensions of sustainable development in the hope that this will produce short-term benefits for individual countries while ignoring the wider longer term environmental, social and economic costs, knowingly leaving these to be borne by future generations.

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Comment [S12]: Changes in lines 257, 259 & 263 for clarity

A significant risk of allowing countries to take unilateral and apparently self-interested approaches by opting out of multi-state arrangements and economic agreements is the threat of a 'race to the bottom' where a country adopts low taxation, relaxed labour laws and reduced regulation as a deceptively attractive way to avoid economic crises. This approach risks increasing health inequity alongside continued restraints on social assistance and environmental protection, with negative impacts on many of the SDGs. Alternatively, a country, region, or state could seek to build an economy which is directed at realising the combined economic, social and environmental benefits associated with implementing the SDGs, with a focus on renewable energy, sustainable food and agriculture and environmentally sustainable technology (recycling, energy conservation, and the like). This may also provide a model of sustaining prosperity given the demographic changes and likely labour shortages if countries, such as the UK, shift away from an economic model which depends on a migrant labour force for continued growth.

Given that it took 21 years of annual conferences of parties to the United Nations Framework Convention on Climate Change before a substantial agreement for action (the Paris Agreement) was achieved in December 2015, there could well be international controversy if reneging on key global commitments weakens the collective resolve. If we accept the fact that human health, and its future survival and prosperity, depend on a liveable earth, we would argue therefore that a refocus of population health to ecological[16] and planetary health[15~~15~~] is the golden thread which binds the SDGs together as a systems approach.[1] This brings us to a fundamental challenge for governments, businesses, consumers and communities.

Comment [S13]: As suggested by reviewer 1

Comment [S14]: Will check this reference with co-authors.

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Growing points

To what extent can we seek to implement the SDGs by improvements in current systems and at what point do we need a paradigm shift in our outlook and aspirations? This subject

has been explored in relation to health and food systems[17] and in relation to regional trade agreements and health related SDGs[18]. However, it has also been clearly addressed by the United Nations Environment Programme's 'Inquiry into the design of a sustainable financial system'[19]. This inquiry points out that 'failure of the financial system to take adequate account of climate change could result in extensive damage to financial assets globally, may well threaten the stability of the financial system itself, and most importantly could impose irreversible damage to the underlying state of the real economy and the quality of life for those who depend on it for their livelihoods', a point that has been repeatedly echoed by some of the most powerful financial organisations and people globally. It is not enough to simply wait until action is obviously needed. As Mark Carney, the Governor of the Bank of England, says: '*…once climate change becomes a defining issue for financial stability, it may already be too late'.*[20]

The existing macroeconomic model had already been challenged by a report prepared for the UK's Sustainable Development Commission in 2009[21] and developed further by their Economics Commissioner[22]. Essentially, this is a challenge to a global economic model, which sees wealth creation based on rising production to meet ever increased demand as the basis of development. This continued consumption based model would be unsustainable even if the world's population was stable but is compounded by the projected increase from 6 billion people in 2000 to potentially 9 billion by 2050; the consequences in terms of resources consumed, waste generated and boundaries exceeded will be an unprecedented planetary emergency[23].

However, before we despair completely, some of these reports are also clear that there would be many social, environmental and economic benefits in changing our current model and that 'transitioning to a green economy opens us to many opportunities as well as posing many challenges'[19~~19~~ 21~~21~~]. The fundamental challenge is aligning the three dimensions across all 17 SDGs and that will challenge many current sectoral interests.

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The UK Stakeholders for Sustainable Development recently coordinated an open letter[24], from over 80 UK businesses, to the Prime Minister, asking her to highlight the UK's commitment to the SDGs at the 2017 World Economic Forum in Davos. This included not just many UK ethical environmental businesses but also many more traditional major multinational companies such as Coca Cola, Tesco, HSBC, Nestle, Land Rover, KPMG and Standard Chartered. It would seem that large corporations are more aware of the need to fundamentally re-shape the economy than many political parties.

Areas timely for developing research

The last 2 centuries have seen huge advances in our understanding of what causes diseases in individuals. There has been far less progress in understanding systematically exactly what causes health in populations: from a village level or a planetary level. The challenge for this generation is to synthesise our knowledge into creating those conditions that foster health and protect us from poverty as much as they protect us from polio. If we continue to devote resources disproportionately to finding ever more detailed causes of disease without considering the solutions to some of the obvious problems we have created for ourselves and others, we will be breaking the implicit contract we have with future generations, with those people who have no voice or choice; that is the agreement that we make every effort to leave the world in a better place than we found it. Without understanding how we collectively protect and improve all those conditions that make life worth living for all, we will be forever remembered as the generation who knew too much and did too little. The art and science of making change is fraught with more human and cultural barriers than with technical or knowledge barriers. The SDGs provide perhaps the last best hope we have of being honest about why and how we should implement the evidence we already have. The number of challenges and opportunities we face, from demographic transitions to new models of economic activity and workforce development makes it essential that we embrace clear and systematic frameworks for action that are measurable

and monitorable and for which we should all be held accountable and responsible. Every generation in history has faced global challenges. 'We Are the First Generation that Can End Poverty, the Last that Can End Climate Change'.[25]

Table 1: Summary of the UN's 17 Sustainable Development Goals, linked to the 5 Areas of Critical Importance

Comment [S15]: See reviewer's comments on placement of tables and figure.

- **People**
  - **No Poverty (Goal 1)**
  - **Zero Hunger (Goal 2)**
  - **Good Health and Well-being (Goal 3)**
  - **Quality Education (Goal 4)**
  - **Gender Equality (Goal 5)**
  - **Clean Water and Sanitation (Goal 6)**
- **Planet**
  - **Climate Action (Goal 13)**
  - **Life below Water (Goal 14)**
  - **Life on Land (Goal 15)**
- **Prosperity**
  - **Affordable Clean Energy (Goal 7)**
  - **Decent Work and Economic Development (Goal 8)**
  - **Industry, Innovation and Infrastructure (Goal 9)**
  - **Reduce Inequalities (Goal 10)**
  - **Sustainable Cities and Communities (Goal 11)**
  - **Responsible consumption and production (Goal 12)**
- **Peace and partnerships**
  - **Peace, Justice and Strong Institutions (Goal 16)**
  - **Partnerships for the Goals (Goal 17)**

Figure 1: UN Graphical Illustration of the 17 SDGs ~~And as a simple well publicised graphical table…~~

(high resolution version available directly from UN SDG sites)~~: Figure 1~~

Table 2: Examples of Targets and Indicators (for Goal 2).[26]

(Extracted from the UN Sustainable Development Knowledge Platform, July 2017)

TARGETS	*INDICATORS*
2.1 By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round	2.1.1 Prevalence of undernourishment
	2.1.2 Prevalence of moderate or severe food insecurity in the population, based on the Food Insecurity Experience Scale (FIES)
2.2 By 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women and older persons	2.2.1 Prevalence of stunting (height for age <-2 standard deviation from the median of the World Health Organization (WHO) Child Growth Standards) among children under 5 years of age
	2.2.2 Prevalence of malnutrition (weight for height >+2 or <-2 standard deviation from the median of the WHO Child Growth Standards) among children under 5 years of age, by type (wasting and overweight)
2.3 By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment	2.3.1 Volume of production per labour unit by classes of farming/pastoral/forestry enterprise size
	2.3.2 Average income of small-scale food producers, by sex and indigenous status
2.4 By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality	2.4.1 Proportion of agricultural area under productive and sustainable agriculture
2.5 By 2020, maintain the genetic diversity of seeds, cultivated plants and farmed and domesticated animals and their related wild species, including through soundly managed and diversified seed and plant banks at the national, regional and international levels, and promote access to and fair and equitable sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge, as internationally agreed	2.5.1 Number of plant and animal genetic resources for food and agriculture secured in either medium or long-term conservation facilities
	2.5.2 Proportion of local breeds classified as being at risk, not-at-risk or at unknown level of risk of extinction
2.A Increase investment, including through enhanced international cooperation, in rural infrastructure, agricultural research and extension services, technology development and plant and livestock gene banks in order to enhance agricultural productive capacity in developing countries, in particular least developed countries	*2.A.1 The agriculture orientation index for government expenditures*
	2.A.2 Total official flows (official development assistance plus other official flows) to the agriculture sector
2.B Correct and prevent trade restrictions and distortions in world agricultural markets, including through the parallel elimination of all forms of agricultural export subsidies and all export measures with equivalent effect, in accordance with the mandate of the Doha Development Round	*2.A.1 Producer Support Estimate*
	2.B.2 Agricultural export subsidies
2.C Adopt measures to ensure the proper functioning of food commodity markets and their derivatives and facilitate timely access to market information, including on food reserves, in order to help limit extreme food price volatility	*2.C.1 Indicator of food price anomalies*

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Comment [S16]: Will also check Reference 26 with co-authors.

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