IPCC 2018 1.5°C Report extracts food security

3.4.6 Food, Nutrition Security and Food Production Systems (Including Fisheries and Aquaculture)

3.4.6.1 Crop production Quantifying the observed impacts of climate change on food security and food production systems requires assumptions about the many non-climate variables that interact with climate change variables.

recent studies confirm that observed climate change has already affected crop suitability in many areas, resulting in changes in the production levels of the main agricultural crops. These impacts are evident in many areas of the world, ranging from Asia to America and Europe and they particularly affect the typical local crops cultivated in specific climate conditions

Temperature and precipitation trends have reduced crop production and yields, with the most negative impacts being on wheat and maize whilst the effects on rice and soybean yields are less clear and may be positive or negative

Climate variability has been found to explain more than 60% of the of maize, rice, wheat and soybean yield variations in the main global breadbaskets areas, with the percentage varying according to crop type and scale

The rise in tropospheric (ground level) ozone has already reduced yields of wheat, rice, maize and soybean by 3–16% globally.

In some studies, increases in atmospheric CO2 concentrations were found to increase yields by enhancing radiation and water use efficiencies. However, observations of trends in actual crop yields indicate that reductions as a result of climate change remain more common than crop yield increases, despite increased atmospheric CO2 concentrations Importantly, the faster growth rates induced by elevated CO2 have been found to coincide with lower protein content in several important C3 cereal grains

Overall, the effects of increased CO2 concentrations alone during the 21st century are therefore expected to have a negative impact on global food security

Crop yields in the future will also be affected by projected changes in temperature and precipitation. Studies of major cereals showed that maize and wheat yields begin to decline with 1°C–2°C of local warming and under nitrogen stress

From CH 5 **At 1.5C 32–36 million people exposed to lower crops, while 2C increases the number ten fold to 330–396 million people exposed to lower yields.**

Cross-Chapter Box 6 | Food Security

Climate change influences food and nutritional security through its effects on food availability, quality, access and distribution.

More than 815 million people were undernourished in 2016, and 11% of the world's population has experienced recent decreases in food security, with higher percentages in Africa (20%), southern Asia (14.4%) and the Caribbean (17.7%).

Overall, food security is expected to be reduced at 2°C of global warming compared to 1.5°C, owing to projected impacts of climate change and extreme weather on yields, crop nutrient content, livestock, fisheries and aquaculture and land use.

The effects of climate change on crop yield, cultivation area, presence of pests, food price and supplies are projected to have major implications for sustainable development, poverty eradication, inequality and the ability of the international community to meet the United Nations sustainable development goals .

Climate change threatens the capacity to achieve SDG 2 and could reverse the progress made already. Food security and agriculture are also critical to other aspects of sustainable development, including poverty eradication (SDG 1), health and well-being (SDG 3), clean water (SDG 6), decent work (SDG 8), and the protection of ecosystems on land (SDG 14) and in water (SDG 15) .

Increasing global temperature poses large risks to food security globally and regionally, especially in low-latitude areas; with warming of 2°C projected to result in a greater reduction in global crop yields and global nutrition than warming of 1.5°C owing to the combined effects of changes in temperature, precipitation and extreme weather events, as well as increasing CO2 concentrations.

Climate change can exacerbate malnutrition by reducing nutrient availability and the quality of food products. Generally, vulnerability to decreases in water and food availability is projected to be reduced at 1.5°C versus 2°C especially in regions such as the African Sahel, the Mediterranean, central Europe, the Amazon, and western and southern Africa

Changes in temperature and precipitation are projected to increase global food prices by 3–84% by 2050 (IPCC, 2013). 2016).

Studies comparing the health risks associated with reduced food security at 1.5°C and 2°C concluded that risks would be higher and the globally undernourished population larger at 2°C change, impacts on dietary and weight-related risk factors are projected to increase mortality, owing to global reductions in food availability and consumption of fruit, vegetables and red meat.

Further, temperature increases are projected to reduce the protein and micronutrient content of major cereal crops, which is expected to further affect food and nutritional security