Golden Rice for Public Health

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Global mortality (millions)	2010[a]	2014[a]	2016/2017
Vitamin A deficiency	1.9–2.8	1.4–2.1	1.3–1.9 (2016)[b]
HIV/AIDS	1.8	1.2	0.94 (2017)[c]
Tuberculosis (TB)	1.4	1.1	1.6 (2017)[d]
Malaria	0.7	0.6	0.45 (2016)[e]

Source: Table 1 in: http://mts.intechopen.com/articles/show/title/golden-rice-to-combat-vitamin-a-deficiency-for-public-health

In the absence of interventions, vitamin A deficiency (VAD) is responsible for 23-24% of global under 5 years deaths.
Vitamin A deficiency is cheaply preventable.
The VAD figures above are child deaths, and exclude significant maternal mortality

In 2020, Covid-19 caused 1.8 million deaths (https://www.worldometers.info/coronavirus/)

Annual mortality from different public health threats.

Vitamin A deficiency (VAD) is caused by insufficient dietary diversity; often driven by poverty.

VAD is the leading cause of childhood blindness.

A source of vitamin A reduces child mortality by 23 – 34%: up to 76% for measles.

The carotenoids in Golden Rice are a source of vitamin A.

Amount of β-carotene in Golden Rice µg/g	Rice consumption per day (g of dry rice before cooking)	Percentage of EAR provided
β-carotene to circulating retinol bioconversion rate: 2.1:1 (e.g. children)		**To a child[a]**
4.0	40	36%
4.0	100	91%
6.0	40	54%
6.0	100	136%
11.2	40	102%
11.2	100	254%
β-carotene to circulating retinol bioconversion rate: 3.8:1 (e.g. adults)		**To an adult**
4.0	40	20%
4.0	100	50%
6.0	40	30%
6.0	100	75%
11.2	40	56%
11.2	100	140%

[a]For 1- to 3-year-old child, 100% of EAR is 210 µg RAE/day. An EAR that does not ensure adequate stores but is enough for normal dark adaptation is set at 112 µg ~50% EAR [46]

Table 2.
The potential for Golden Rice to deliver the estimate average requirement of β-carotene, as a source of vitamin A, to 1–3-year-old children and adults.

EAR = Estimated Average Requirement
RAE = Retinol Activity Units
30-40% EAR is sufficient to prevent VAD
(no overdosing risk with beta-carotene)

As a Genetically Engineered ('GE') crop, Golden Rice must meet many regulatory requirements re safety to humans, animals and the environment.

(GE because 2 genes of interest were added once, as reported in 2004)

Golden Rice was approved for feed and food use in Australia (in 2017), Canada (2018), New Zealand (2017), USA (2018), and the Philippines (2019).

The **Philippine Rice Research Institute** completed, in September 2019, the final field trials needed to make an application for commercial propagation.

The Completion Certificate was issued early August 2020 by the Dept. of Agriculture, Bureau of Plant Industry (BPI).

The application for commercial propagation was submitted end September 2020.

The Bangladesh Rice Research Institute (BRRI) submitted its application for cultivation approval, including for food use, at the end of November 2017.

- Since then, the National Committee on Biosafety (NCB) under the Ministry of Environment, Forest, and Climate Change, and its technical core committee, have only met very infrequently.
- BRRI has fully responded to any and all questions raised to date.
- The lack of a truly operational regulatory system and the absence of a predictable process for NCB meetings is a major impediment to progress.