

# Methodology for calculating Lives Reached

DSM's Purpose is to create Brighter Lives for All.

We do this by:

- Improving and adapting our own operational impact
- Enabling our customers and partners to deliver sustainable and healthy solution for the planet and society
- Advocating for the future we believe in

This white paper explains the methodology for how we measure our Reach.

## Scope

The intent of 'Lives Reached' is to support the company purpose, with the focus on quantifying progress towards reaching as many people as possible. In this methodology, we are not measuring and controlling for the impact or outcome of the 'reach'.

For this first iteration, the scope is limited to where the data and evidence is strongest. As we further refine the methodology and scope, we will add additional markets and will, for full transparency, update this document accordingly. Only consumer applications are taken into account with this method – our products that have industrial applications are excluded due to the distance from end consumers (for example, the role of our fiber optic coatings in global telecommunications infrastructure).

The activities that we have taken into scope for this exercise are in Nutritional Products (Human Nutrition and Health, and Personal Care and Aroma Ingredients). Between them, these businesses represent more than 25% of DSM's business. Our initial "Lives Reached" metric relates only to these activities.

Within these businesses, the following end markets have been taken into scope:

Human Nutrition and Health – Early Life Nutrition, Food and Beverage, Medical Nutrition, Dietary Supplements, Nutrition Improvement, Pharma

Personal Care and Aroma Ingredients – Sun Protection

The other business groups (Nutritional Products [Animal Nutrition and Health], Food Specialties, Engineering Plastics, Dyneema, Resins and Functional Materials, Innovation Center), joint ventures and partnerships are considered out of scope for this first calculation of Lives Reached. In future, these may be brought into scope.

## Methodology

The number of lives reached is calculated for each market separately and then aggregated to come to a total figure. Double counting is eliminated using statistical methods.

Product touchpoints are assumed to be statistically unrelated. Due to our position as a B2B company, we are not able to measure 'Reach' at a country/regional level, as it is too much to assume that products sold to our customers are also sold to end consumers in the same country. We base our calculations to the greatest extent on global figures. The actual overlap may be larger or smaller than calculated based on this assumption.

## Nutritional Products - Human Health and Nutrition

Our Human Health and Nutrition business is divided across:

- Early Life Nutrition
- Food and Beverage
- Medical Nutrition
- Dietary Supplements
- Nutrition Improvement
- Pharma

These nutritional products are a consumed product, there is no difference in calculating the Lives Reached in a calendar versus Lives Reached over the usable lifetime of the product. It is assumed that the number of products sold in a given year is equivalent to the consumption in that year.

## Early Life Nutrition (ELN)

ELN is broken up across several market products that reach mother and baby at different stages of life.

For each market, Reach is calculated based on the total market multiplied by DSM's estimated market share, divided by the recommended dosage and the expected consumption period (e.g. 50 grams per day, for 120 days).

## Food and Beverage

For F&B, the total market is calculated based on an internal estimate of the % of the global population that consume fortified food. This excludes ELN and Dietary Supplements. This market is multiplied by our estimated market share.

### Medical Nutrition (MN)

Reach in the MN area is comprised of two main groups – the general 65+ population and the pre/post operations in hospitals (corrected for potential double counting by subtracting key age-specific disease groups).

There are some 650 million people in the world over 65 years of age. Reach is calculated based on an estimated share of this group who are using MN products and the estimated market share we have of this market.

The total number of hospital patients (excluding double counting) is estimated at ~300 million people. Reach is calculated at the lower end of this range, multiplied by the estimated share that are using MN products and the estimated market we have of this market.

### Dietary Supplements (DS)

The calculation for DS is based on the key representative vitamin (Vitamin C). The average consumer is assumed to take a full dose every other day. Total number of doses is calculated by the total sold volume divided by the daily recommended intake. This is multiplied by 2 to come to the total Reach in DS.

### Nutrition Improvement (NI)

NI targets a number of interventions in many (mostly developing) countries with many partners, and includes target products such as micronutrient powders, high dose vitamin A supplements, therapeutic and emergency foods (e.g. supercereals and lipid nutrient supplements [LNS]) and staple foods such as flour, oil and sugar. Reach is calculated based on total sales divided by the estimated consumption per person per time frame (e.g. 30 g per day for 100 days in a calendar year equals 3kg per person), or estimated total market multiplied by market share. Overlap is addressed using the statistical method described below.

### Pharma

Our vitamins are also used as active pharmaceutical ingredients (APIs). This calculation starts with the total number of drug doses sold in a calendar year that contain at least 1 vitamin API. This is divided by the average treatment duration of these types of drugs, the number of drugs that are expected to be taken by one person and the daily dosage of the drug. The result is multiplied by DSM's estimated market share to calculate our Pharma Reach.

### Nutritional Products – Personal Care and Aroma Ingredients

In Personal Care, we focus on the Sun Protection market.

#### Sun Protection

Our Reach in sun protection is calculated based on the total population who have used products containing sun protection multiplied by our market reach.

#### Overlap

We expect a certain overlap in product usage between the different markets we serve (i.e. people may sun protection and take nutritional products). We assume that the product overlaps are statistically uncorrelated – using sun protection does not make you more, or less likely to use a nutritional product. The overlap of NI with other nutrition markets is limited, however overlap is still calculated to remain on the cautious side.

This overlap can be calculated using De Morgan's Law<sup>1</sup> and Probability Theory<sup>2</sup>:

**De Morgan's Law** states that the set that is not in the sets A and B is equal to the set that is not in set A or in set B, or  $(A \cup B)^c = A^c \cap B^c$ .

**Independence in Probability Theory** states that the probability of being in set A and set B equals the probability of being in set A multiplied by the probability of being in set B, or  $P(A \cap B) = P(A) * P(B)$ .

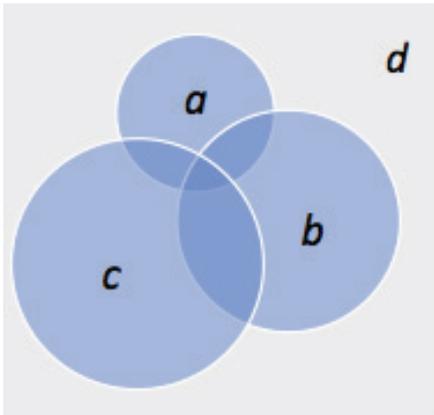
The total of Lives Reached is defined as the union of the Lives Reached by each market (the population reached or "set" of the market). Statistically, using De Morgan's Law and Probability Theory, this can be defined as

**Lives Reached** = union (lives reached per market)  
= total market – the population that are not in any of the markets  
= total market multiplied by (1 – probability not in any of the markets)

<sup>1</sup> De Morgan laws. Encyclopedia of Mathematics. URL: [http://www.encyclopediaofmath.org/index.php?title=De\\_Morgan\\_laws&oldid=35218](http://www.encyclopediaofmath.org/index.php?title=De_Morgan_laws&oldid=35218)

<sup>2</sup> Independence. Encyclopedia of Mathematics. URL: <http://www.encyclopediaofmath.org/index.php?title=Independence&oldid=25533>

For example, for a population  $x$  (50 people), with three 'markets' A, B and C with lives reached of  $a$  (10 people),  $b$  (20 people) and  $c$  (25 people). The population not in any of these markets is  $d$  (represented in grey).



**Lives Reached** = union (A, B and C) – represented in blue  
 =  $x - d$  [defined as not(union (A, B and C))]  
 =  $x * (1 - [P(\text{not A}) * P(\text{not B}) * P(\text{not C})])$

**The probabilities can be described as:**

Market	Probability in market	Probability not in market	
A	$a/x = 10/50 = 20\%$	$(x - a)/x$	$= (50-10)/50$ $= 80\%$
B	$b/x = 20/50 = 40\%$	$(x - b)/x$	$= (50-20)/50$ $= 60\%$
C	$c/x = 25/50 = 50\%$	$(x - c)/x$	$= (50-25)/50$ $= 50\%$
	Probability of $d$ – $P(d)$	$80\% * 60\% * 50\%$	$= 24\%$
	Population not in market ( $d$ )	$x * P(d)$	$= 50 * 24\%$ $= 12 \text{ people}$
	<b>Lives Reached</b>	$x * [1 - P(d)]$	$= 50 * (1 - 24\%)$ <b>= 38 people</b>