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'.

Only consumer applications (applications which reach, or are used by an individual) are considered 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).

Lives Reached is calculated based on products sold during the calendar year. Where products are consumed multiple times in a year, we have divided the Lives Reached by that product by the estimated consumption pattern over the year. For products that have a multi-year lifespan, we only measure the Lives Reached by sales in the calendar year, not in subsequent years.

The activities that we have taken into scope for this exercise cover our business segments as defined in 2021 – Nutrition, Materials and Innovation Center. Between them, these activities represent approximately 25% of DSM's business.

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

DSM Nutritional Products:

- Human Nutrition and Health – Early Life Nutrition, Food and Beverage, Medical Nutrition, Dietary Supplements, Nutrition Improvement, Pharma
- Animal Nutrition and Health – Premixes for Farmers
- Personal Care and Aroma Ingredients – Sun Protection

DSM Food Specialties – Cheese enzymes

DSM Engineering Materials – Mobile device connectors

DSM Protective Materials – Dyneema Protective Gloves, Protective Vests and Denim

DSM Innovation Center – EBA Biomedical – Vascular Coatings

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.

DSM Nutritional Products - Human Health and Nutrition

Our Human Health and Nutrition business is divided across:

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

It is assumed that the number of products sold in a given year is equivalent to the consumption in that year.

Dietary Supplements (DS)

The calculation for Dietary Supplements 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.

Early Life Nutrition (ELN)

Early Life Nutrition 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). This figure may then be adjusted for overlap with other products that service the same target group.

Food and Beverage

For Food & Beverage, 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 Medical Nutrition 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 – 350 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.

Nutrition Improvement (NI)

Nutrition Improvement targets several interventions in (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. super cereals, lipid nutrient supplements (LNS)), and staple foods such as flour, oil and sugar. Reach is calculated based on total sales divided by the estimated cost per person.

Pharma

Our vitamins are also used as active pharmaceutical ingredients (APIs). Starting point for this calculation is 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.

DSM Nutritional Products – Personal Care and Aroma Ingredients

In Personal Care, we focus on the Sun Protection market. Many products containing sun protection on the market contain DSM materials. Our Reach in Sun Protection is calculated based on the total population who have used products containing sun protection multiplied by our market reach.

DSM Nutritional Products – Animal Health and Nutrition

In Animal Health & Nutrition, we support farmers directly or indirectly through our animal nutrition supplements. The indirect lives reached is calculated based on the nutritional supplements which are sold via cooperatives and resellers. The total number of cattle which are mineralized by this volume of sales is divided by the average herd size to arrive at the number of farmers reached. Lives reached is the total numbers of farmers in the chosen geographic region which are reached via cooperatives and resellers plus the total number of farmers who directly purchase products from us.

DSM Food Specialties

Within DSM Food Specialties, we look at the Lives Reached through cheese. The total number of cheese consumers is estimated based on market data, and addresses people who consume cheese at least once per month. Lives reached is total amount of people who consume cheese multiplied by DSM's market shares in the cheese enzyme market.

DSM Engineering Materials

Calculation of lives reached here is based on the estimated market share of DSM with OEM manufacturers using USB-C and Lightning connectors. Total device shipments by OEM manufacturer is calculated from OEM market shares and total device shipments data.

DSM Protective Materials

DSM Protective Materials' Dyneema® has many different applications. For this calculation, three have been selected and Lives Reached is calculated for each product using a similar methodology.

Gloves
The total amount of Lives Reached is calculated based on the total amount of Dyneema® for the production of gloves divided by the average amount used in each pair of gloves divided by the expected usage of gloves per person per year.

Protective vest
The total amount of Lives Reached is calculated based on the total amount of Dyneema® sold for the production of protective vests divided by the amount used per vest. It is assumed that, on average, a person uses a single vest over a calendar year.

Denim
The total amount of Lives Reached is calculated based on the total amount of Dyneema® which is sold for the production of denim. This is divided by the volume of fiber used in a pair of jeans.

DSM Biomedical

Several categories of biomedical vascular coating have been selected for calculation of Lives Reached. This is calculated based on quarterly reports by key partners of units of product produced using our vascular coatings divided by the average number used in each intervention.

Overlap

We expect a certain overlap in product usage between the different markets we serve (i.e. people may have a mobile device, a car and take nutritional products). We assume that the product overlaps are statistically uncorrelated – owning a mobile phone does not make you more, or less likely to own a car or. 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[1] and Probability Theory[2]:

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 $(A \cup B)^c = A^c \cap B^c$.

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. Statistically, using De Morgan's Law and Probability Theory, this can be defined as

Lives Reached= union (lives reached per market)

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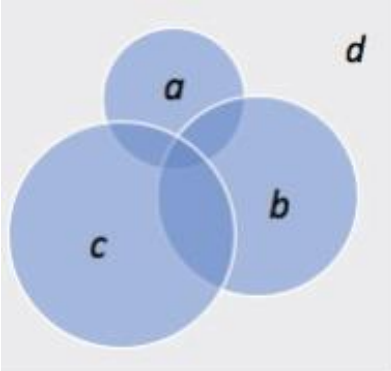
[1] De Morgan laws. *Encyclopedia of Mathematics*. URL: http://www.encyclopediaofmath.org/index.php?title=De_Morgan_laws&oldid=35218
[2] Independence. *Encyclopedia of Mathematics*. URL: http://www.encyclopediaofmath.org/index.php?title=Independence&oldid=25533

= total market – the set that are not in any of the markets
= total market multiplied by (1 – probability not in any of the markets)

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(not A) * P(not B) * P(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 = 10 / 50 = 20%	(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 people
	Lives Reached	x * [1-P(d)]	= 50 * (1 – 24%) = **38 people**