



Priorities in IEC from Chinese Perspective and how IEC can contribute

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2019-10-23 Shanghai

Safety

- Safety of household electrical appliance in plateau complicated environment

Health

- Tele-medicine & Tele-surgery under 5G network

Nutrition

- Healthy nutritional cooking of electrical appliances

Clean water

- Household and similar drinking water purifiers

Better life

- Customization of household electrical appliances

1.Safety of household appliance in plateau complicated environment

Distribution of world plateaus



❖ **The proportion** of plateau is more than **1/3** of total earth land surface

❖ **Many continents are involved:**

Asia: Tibetan plateau, Mongolia plateau, Pamir plateau, Iran plateau.....

Africa: Ethiopia Plateau, East Africa plateau, South Africa plateau.....

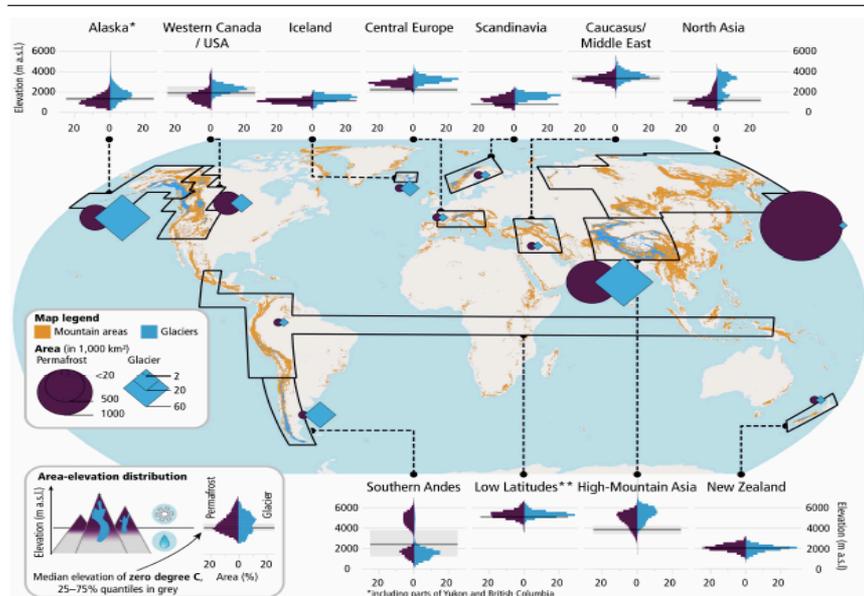
America: Mexico plateau, Bolivia plateau, Ecuador plateau.....

❖ **Many countries are involved:**

Afghan, Armenia, Bhutan, Brazil, Bolivia, Chile, China, Ethiopia, Kyrgyzstan, India, Mexico, Mongolia, Iran, South Africa, Tajikistan.....

1.Safety of household appliance in plateau complicated environment

Population in Plateau area worldwide



Source: IPCC report

IPCC (Intergovernmental Panel on Climate Change, UN) :

Almost **10% (671 million)** people of the global population lived in high-mountain regions in 2010, this population is expected to grow to **736–844 million** across the shared socio-economic pathways by 2050

Some countries situation:

China: Exceed **100 million** population live in plateau area

Bolivia: **70%** population live in plateau area

Ethiopia : Total population **100 million**, proportion of plateau exceed **2/3**

1.Safety of household appliance in plateau complicated environment

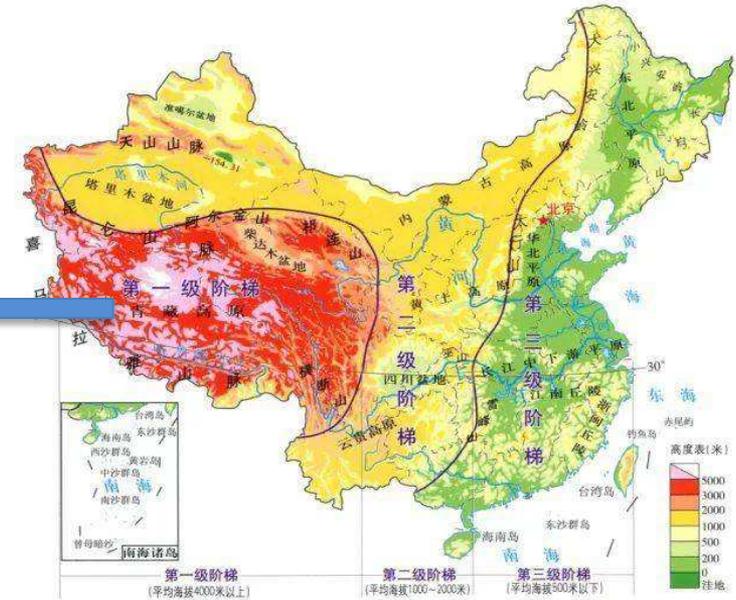
For example, in Qinghai province China, 75% population live at the altitude of 1600-2600m, in Tibet, most population live at the altitude of 4000m.

Altitude	Population Density								
500	7.2	2000	29.7	3000	29.4	4000	66.9	5000	15.1
800	17.1	2100	23.6	3100	41.1	4100	60.1	5100	13.3
900	8.2	2200	44.5	3200	30.5	4200	51.5	5200	11.4
1000	5.1	2300	50.7	3300	44.2	4300	43.7	5300	8.9
1100	5.9	2400	55.1	3400	35.6	4400	41.1	5400	8.2
1300	5.8	2500	47.1	3500	43.8	4500	36.2	5500	7
1500	3.8	2600	67.4	3600	50.6	4600	39	5600	4.8
1600	13.1	2700	10.9	3700	53.3	4700	36.6	5700	1.8
1800	10.6	2800	21	3800	49.7	4800	30.4	5800	1.6
1900	37.6	2900	28.3	3900	59.3	4900	21.3	5900	1.4

1.Safety of household appliance in plateau complicated environment

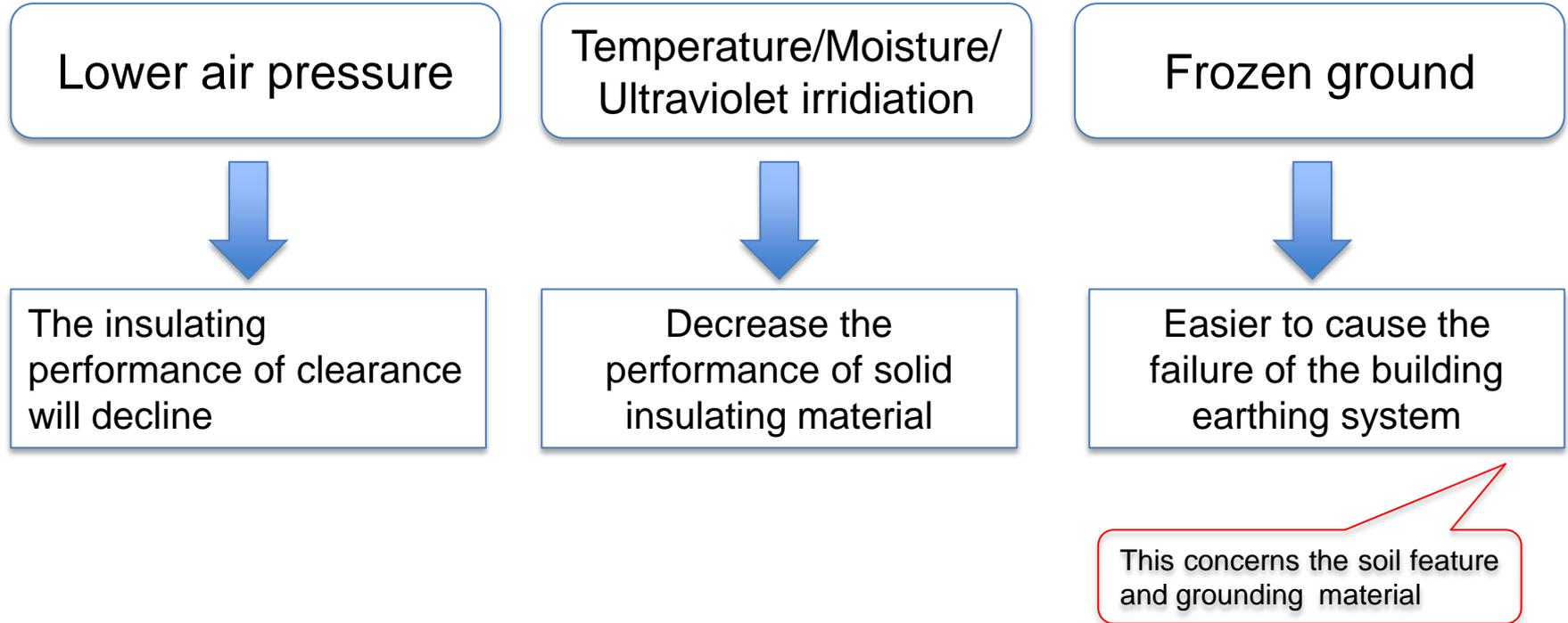
High-altitude climate feature(Tibetan plateau as an example)

- ❖ Lower air pressure/density
- ❖ greater temperature variation from day to night
- ❖ Stronger solar irradiation
- ❖ Frozen ground(thick, long-term)
- ❖ Stronger windy and sandy climate



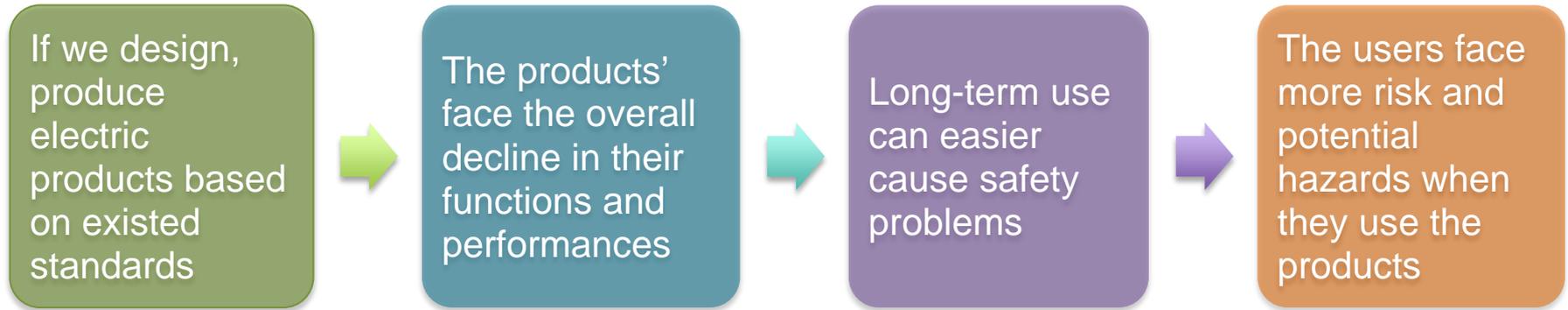
1. Safety of household appliance in plateau complicated environment

The effects on household appliances' safety



1.Safety of household appliance in plateau complicated environment

IEC standards, e.g. IEC60335 series have been developed mainly based on plain environment. Due to the complicated climate and geographic environment in plateau:



We need technical solution to guarantee the safety under plateau condition!!!

1. Safety of household appliance in plateau complicated environment

So, We propose IEC to establish an organization to start the research on electric appliances used in plateau environment.



This can be a referent way for other fields of IEC

Safety use time limits is one of the important considered approach(e.g. Through the way to calculate and predict the material life time based on the influence factor)

1. Safety of household appliance in plateau complicated environment

This is **IMST model**

$$t_R = \eta(-\ln R)^{1/\beta} = \frac{a(1.1 - H \times 10^{-4})}{U} \exp\left(\frac{b}{T}\right) RH^{-c} (-\ln R)^{1/\beta}$$

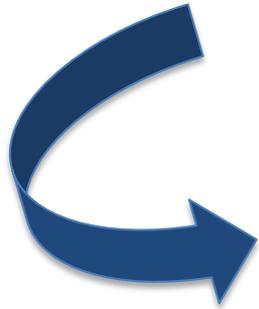
This is **EST model**

$$t_R = \eta(-\ln R)^{1/\beta} = a \left[(1-b)O + b \right]^{-1} \left[(1-d)S + d \right]^{-1} 10^{-c(1-pH)} (-\ln R)^{1/\beta}$$

1. Safety of household appliance in plateau complicated environment

To protect global 700 million plateau population more safer

To enhance the infrastructure construction like building earthing system in plateau countries and area.



SUSTAINABLE DEVELOPMENT GOAL 17

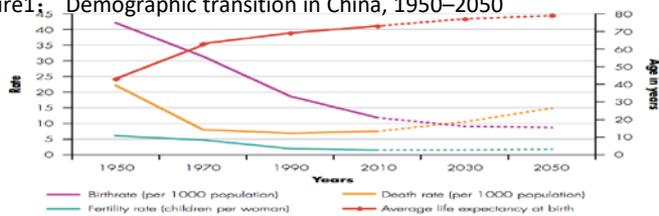
Strengthen the means of implementation and revitalize the global partnership for sustainable development

2. Tele-medicine & Tele-surgery under 5G network

Background : Population and social situation:

Population ageing in China

Figure1: Demographic transition in China, 1950–2050



Source: UN DESA, 2013a.

China is ageing much faster than other low- and middle-income countries. The proportion of the population aged 60 years and over will increase from 12.4% in 2010 to 28% in 2040. Women outlive men, and populations in rural areas have higher proportions of older people.

Chronic Population Ratio (%)

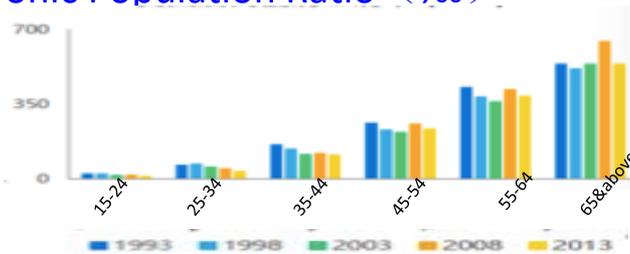
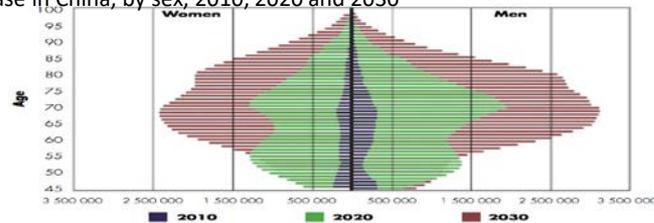


Figure 2: Effect of ageing on the number of people suffering from at least one chronic disease in China, by sex, 2010, 2020 and 2030



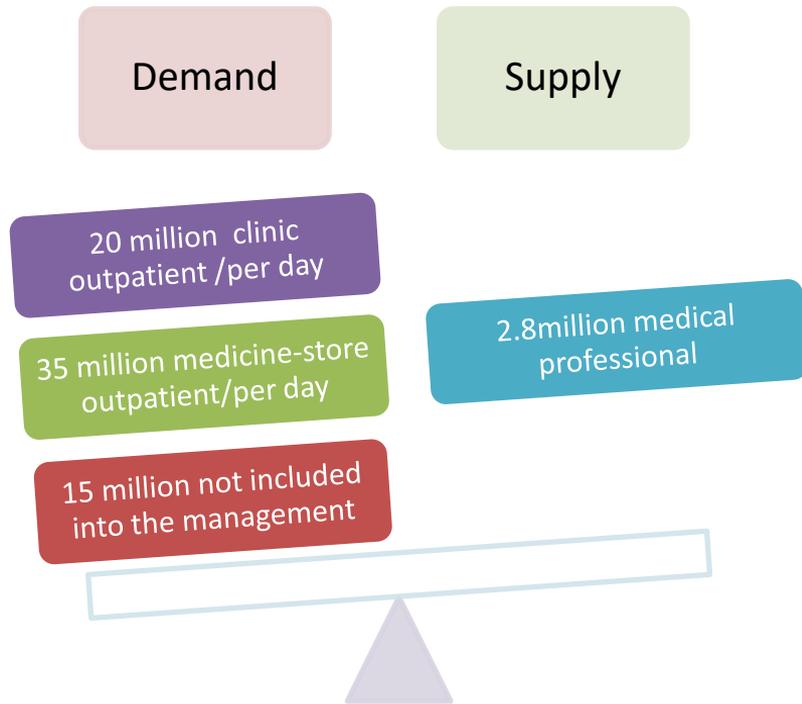
Source: Wang, Marquez & Lauenbrunner, 2011.

A health transition from communicable to noncommunicable disease is well under way in China. Chronic noncommunicable disease prevalence will increase by at least 40% by 2030. Almost 80% of all deaths in people aged 60 years or over are attributable to chronic noncommunicable disease.

The chronic population is in a rapid increase: The diagnosed nearly **300 million**, the incidence rise **8.7%** per year.

2. Tele-medicine & Tele-surgery under 5G network

Background: Medical resource is of shortage, the gap between demand and supply of China



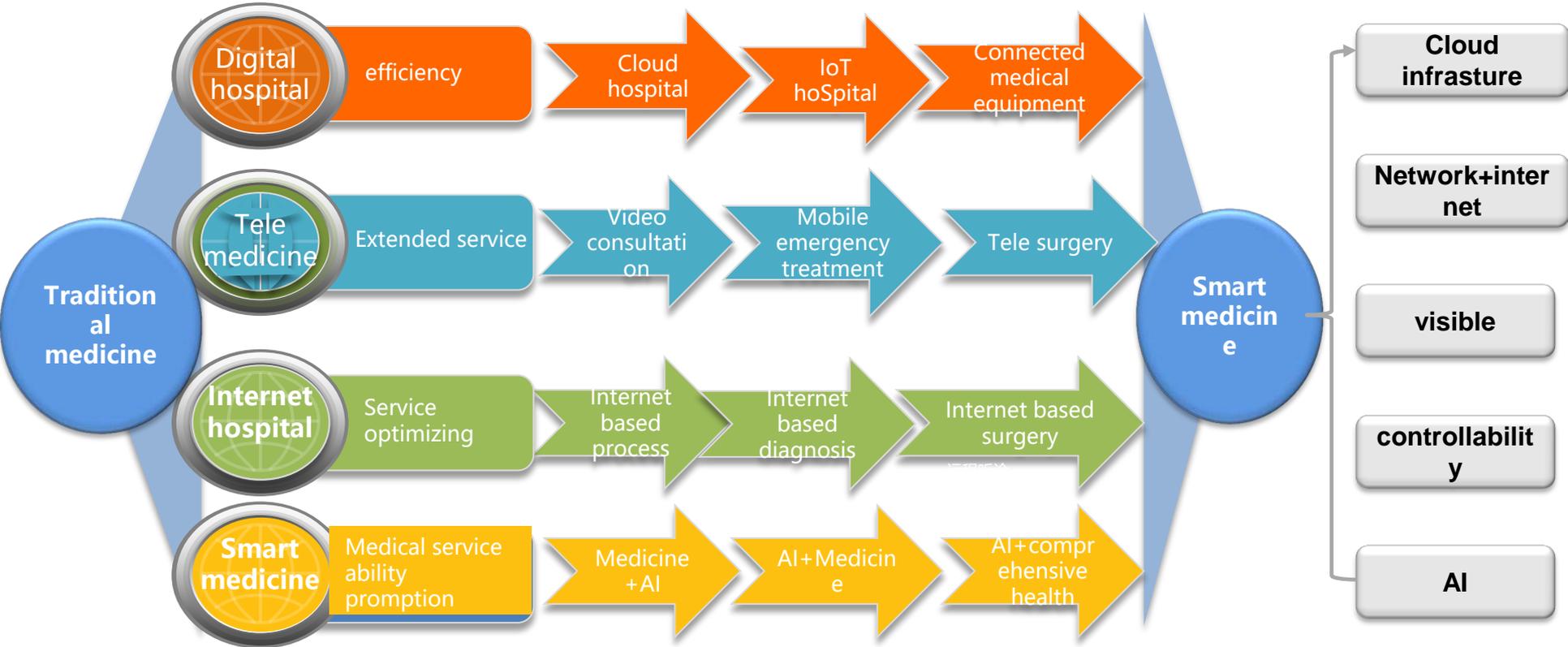
The shortage of medical professionals and workforce:

2.8 million-20million

The imbalance between demand and supply of medical service has become the the main driven force for tele-medicine

2. Tele-medicine & Tele-surgery under 5G network

Traditional medicine move towards smart medicine



2. Tele-medicine & Tele-surgery under 5G network

Tele-surgery under 5G network



Beijing

5G Transmission



1000 km



Suzhou

The feasibility analysis of Tele robot surgery under 5G network was carried out by animal experiment.

In 5G network environment we remotely controlled the bedside operating system to conduct the experiment to test the stability and safety of remote surgery.

2. Tele-medicine & Tele-surgery under 5G network

Results

- The surgeon directly controlled 2 robot and a camera arm.
- The whole experiment took about 60 minutes and the bleeding was about 5 ml.
- The intraoperative high-definition 3D image and sound transmission are instantaneous and stable.
- The bedside robot arm is smooth and flexible.
- The master-slave tracking was good and no error was made.
- The master-slave mapping model was correct.
- The delay time from the actuator to the robot arm was less than <150 millisecond.

2. Tele-medicine & Tele-surgery under 5G network

Conclusion

- The 5G network provides the possibility of remote wireless surgery on the network.
- We predict the future practical application scenario:
there is not only a peer-to-peer model, but also a doctor can perform or guide surgery on multiple hospital at same time, and also multiple doctors can perform one surgery synergistically.
The latter model is more important in medical terms.

2. Tele-medicine & Tele-surgery under 5G network

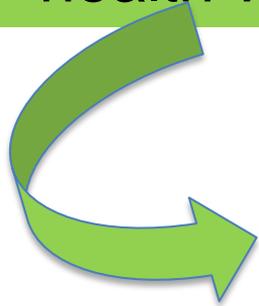
We suggest

- The consumer and industrial sectors are currently considered, but remote surgery should be considered by IEC.
- In the future, special considerations should be given to communication technologies for remote surgery, such as transmission delays, data loss, and reliability.

2. Tele-medicine & Tele-surgery under 5G network

To make the health system more responsive and efficient

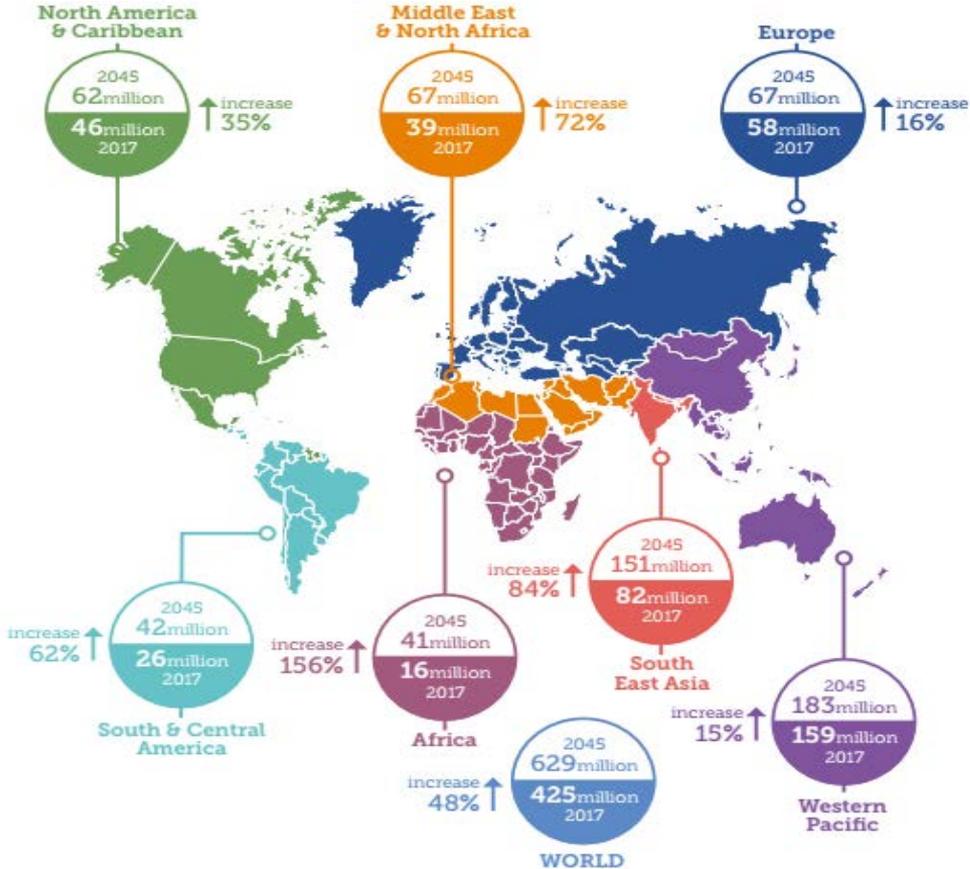
To relieve the shortage and distribution imbalance of health workforce through ICT & AI.



SUSTAINABLE DEVELOPMENT GOAL 3

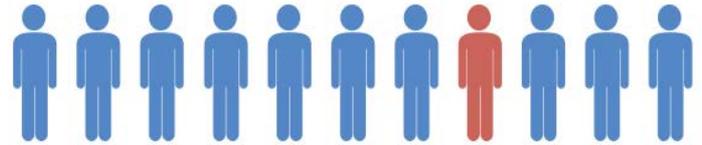
Ensure healthy lives and promote well-being for all at all ages

3. Healthy nutritional cooking of electrical appliances



Diabetes is a global chronic disease. There are 425 million diabetic patients in the world. It is estimated that there will be nearly 700 million diabetic patients by 2045.

There is one diabetic in every 11 adults



1/6 of fetuses are affected by hyperglycemia during pregnancy

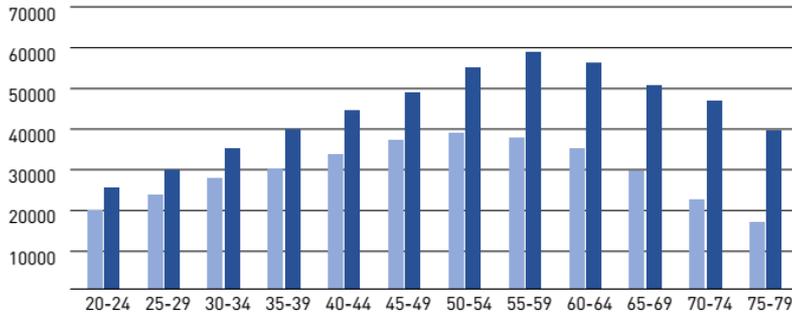


The number and growth rate of diabetes mellitus worldwide in 2017 and 2045

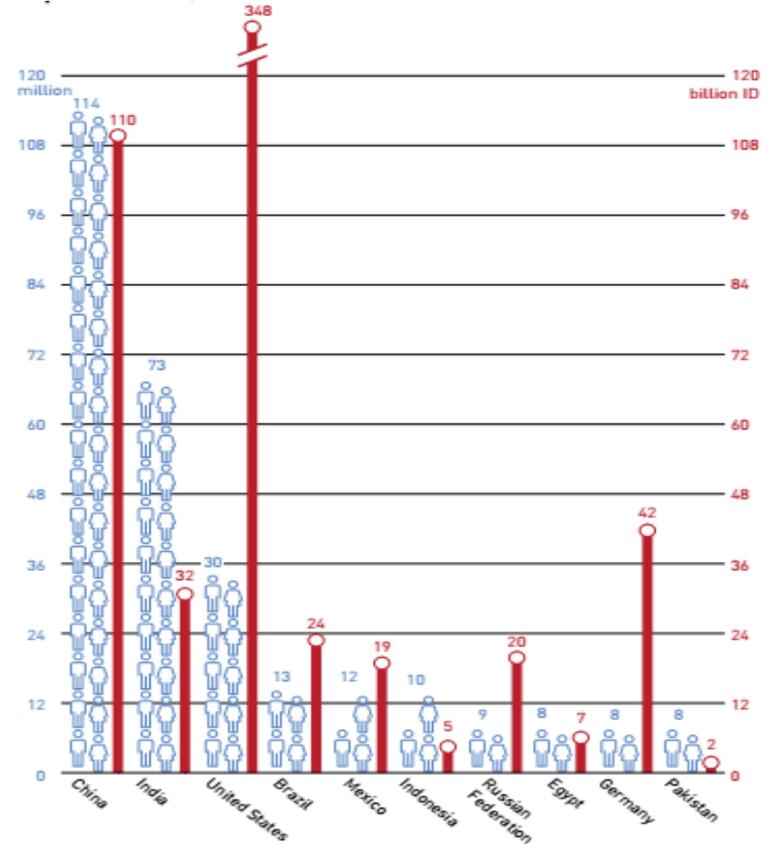
3. Healthy nutritional cooking of electrical appliances

In 2017, the number of people with impaired glucose tolerance reached 352.1 million. It will reach 587 million by 2045.

There are 114 million diabetics in China, and the total number of diabetics and people with impaired glucose tolerance is about 400 million.



● 2017 ● 2045 Number of impaired glucose tolerance in all age groups



Top Ten Countries and Corresponding Medical Expenditures for Adult Diabetes (2017)

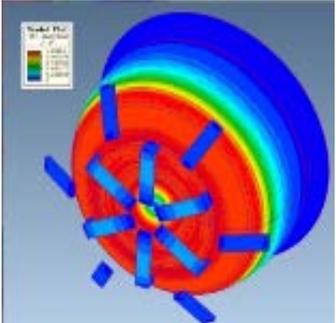
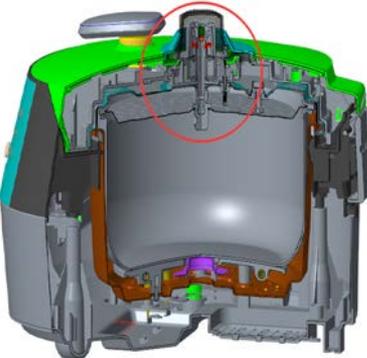
3. Healthy nutritional cooking of electrical appliances



Daily diet is directly related to blood sugar



Special design of electrical appliances



Effective control of blood sugar

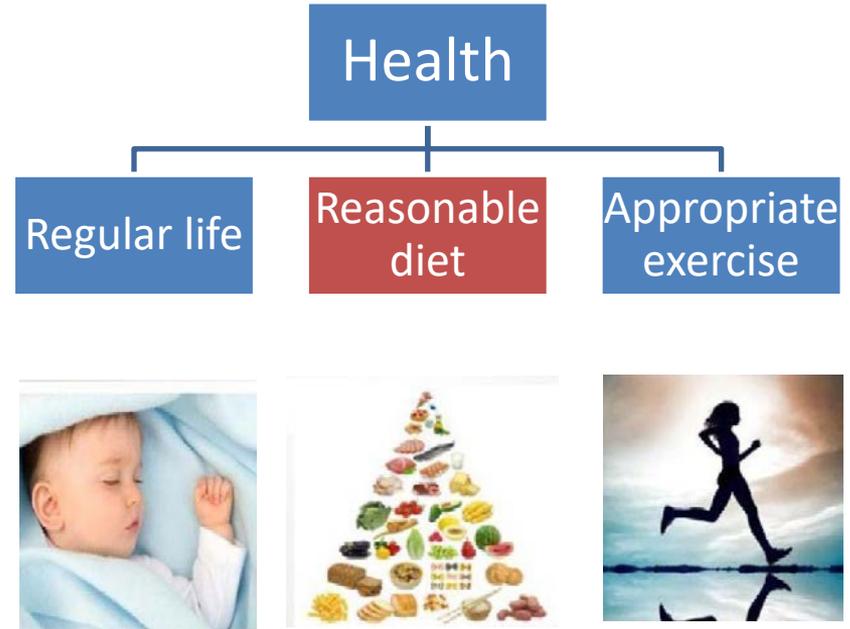
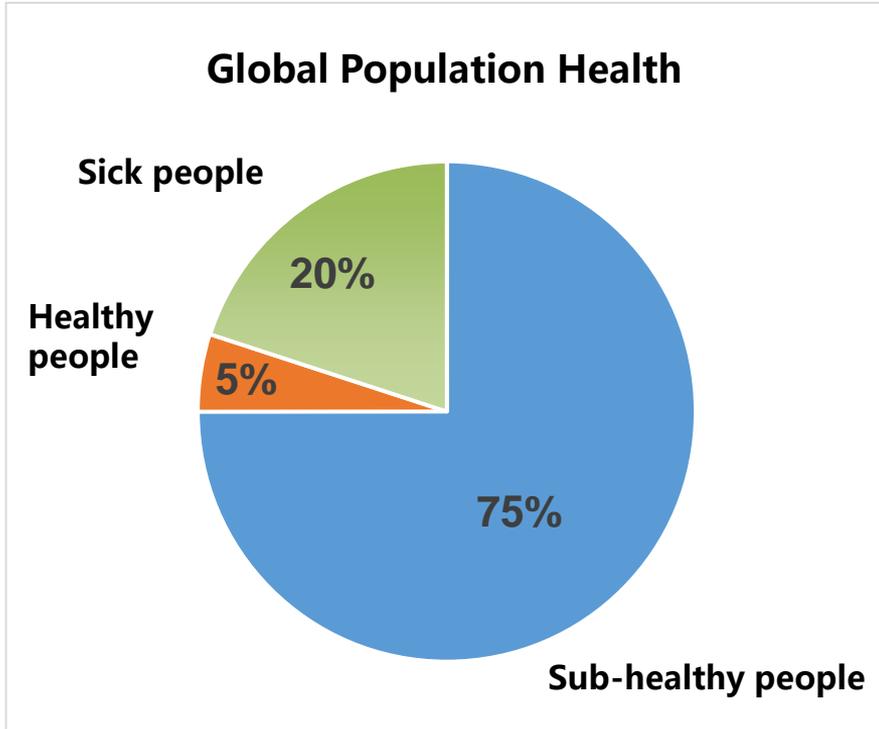
3. Healthy nutritional cooking of electrical appliances

China existing research on blood sugar control of staple foods cooking by electrical appliance

- Study sugar control effects and digestive absorption of staple foods
- Solve the problem that staple food makes blood sugar rise too high and too fast and the problem of inhomogeneous digestion and absorption
- Meet the healthy dietary needs of different groups of people



3. Healthy nutritional cooking of electrical appliances



3. Healthy nutritional cooking of electrical appliances

Other existing research on healthy nutritional cooking of electrical cooking appliances

- Study the relationship between crushing food and digestion, absorption and nutrient release
- Study the cooking regulation mechanism of nutrients and flavors in soup and dishes, and form the cooking technology database



3. Healthy nutritional cooking of electrical appliances

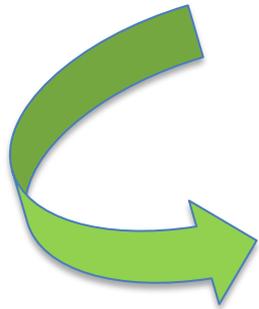
We suggest IEC to establish an organization to start the research on healthy nutritional cooking of electrical cooking appliances to improve human health.



3. Healthy nutritional cooking of electrical appliances

Prevention > Treatment

Healthy and nutritious cooking can make the daily diet more reasonable and effectively prevent many chronic diseases



SUSTAINABLE DEVELOPMENT GOAL 3

Ensure healthy lives and promote well-being for all at all ages

4. Household and similar drinking water purifiers

- Around three-tenths of the world's population can't obtain safe and accessible household water
- Polluted environment kills 1.7 million children every year
- More than a quarter of deaths among children under five are caused by unhealthy environments, including air pollution, secondhand smoke, unsafe drinking water, lack of sanitation



4. Household and similar drinking water purifiers

- WHO Says: 80% of diseases, including cardiovascular diseases, stones, liver cancer, gastric cancer, child deaths, intestinal infectious diseases and so on, are related to drinking water pollution.
- Developing countries: more than 1 billion people are threatened by water borne diseases.



4. Household and similar drinking water purifiers

- Water source protection and treatment is a long-term work.
- How to drink healthy and sanitary water before thoroughly solving water source pollution?

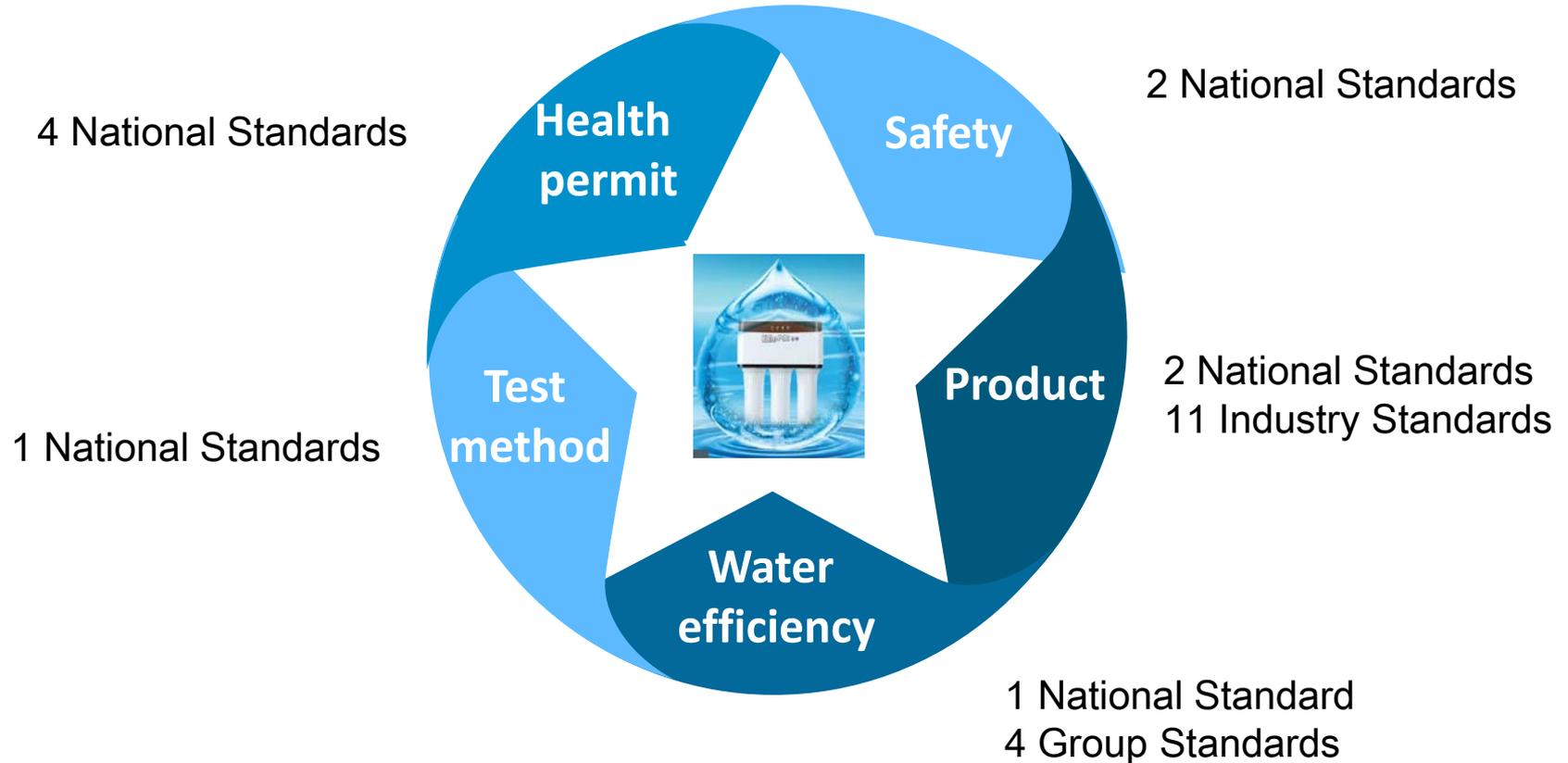
That's why we use water purifiers

- However, there is no IEC TC/SC to deal with this kind of standardization work.
- We propose IEC to establish an organization to start the research on water purifiers and systems.



4. Household and similar drinking water purifiers

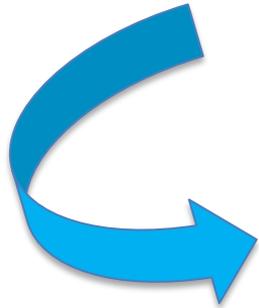
Chinese standards on water purifier



4. Household and similar drinking water purifiers

Let people all over the world drink clean water

Water purifiers and systems can play an important role



SUSTAINABLE DEVELOPMENT GOAL 6

Ensure availability and sustainable management of water and sanitation for all

5. Customization of household electrical appliances

Current Situation of Customization Industry

Status: Difficult to Achieve

Staying at the conceptual stage, with fewer solutions and fewer implementation enterprises

Reason: Optimized value cannot be achieved

Too high cost, too long production cycle, unable to meet customer needs

Root: Lack of Standards

The standard system at this stage can not meet the demand of "quick response and low cost", lack of standard control for the use safety and quality of customized products.

SUMMARY

The biggest obstacle for industrial 4.0 / industrial Internet to be applied in household appliances enterprises is that it is impossible to use online test instead of laboratory type test, and to ensure the safety of the personalized customization products.

5. Customization of household electrical appliances

Background of Customization

Manufacturing industry development

Upgrading Manufacturing Industry is the Primary Task of the New Industrial Revolution

The fourth industrial wave represented by "Industrial 4.0" and "Industrial Internet" has come.

Changes in consumer markets

New consumers want to stay close to the consumer process, so as to ensure that the products or services they buy are what they need.

Consumers are not only buying products, but also buying experience and comfort of life.

5. Customization of household electrical appliances

Advantages of Customization

1

Make enterprises respond quickly to rapidly growing demand, so that the products of enterprises are listed earlier than competitors, and obtain excess profits.

2

Make enterprises quickly adapt to changes in market, technology, standards and trends, and timely launch new products in line with consumer trends.

3

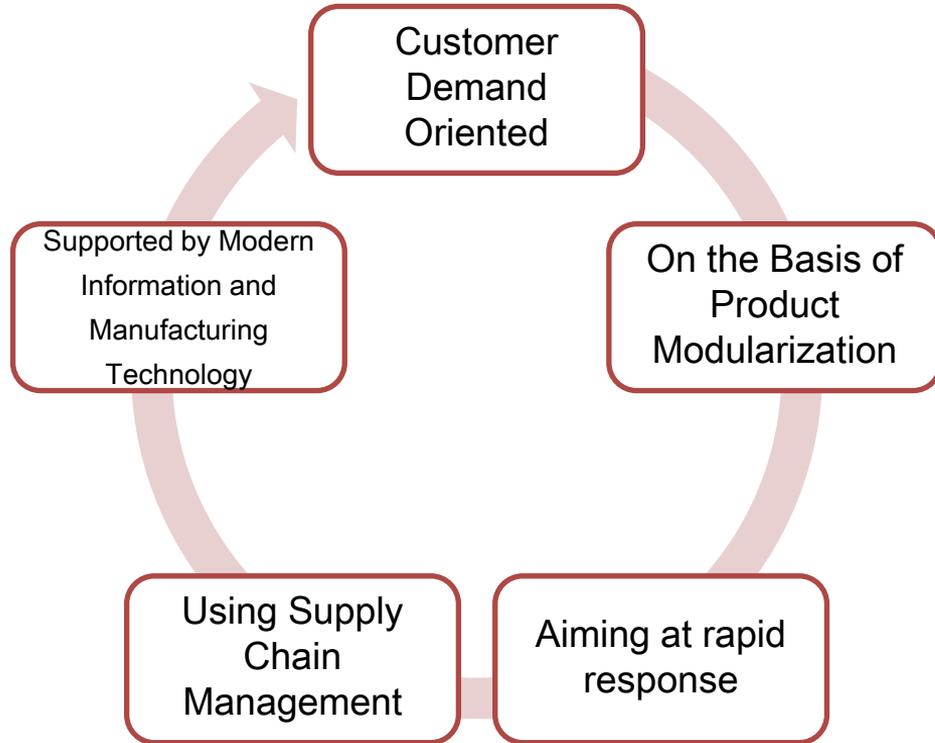
Help enterprises enter new markets and attract a large number of customers whose personalized needs can not be satisfied by standard products, so as to further expand market share.

4

Reduce the development and production cost of customized products effectively.

5. Customization of household electrical appliances

Technical Characteristics of Customization



5. Customization of household electrical appliances

Existing standards in China

- National Standards
 - Guidelines for customization of household electrical appliances
 - Modularization design for household and similar electrical appliances—
Guideline for refrigerator
 - Modularization design for household and similar electrical appliances—
Guideline of air conditioners
- Group standards
 - General technical specification for mass customization of household electrical appliances industry
 - Industrial cloud construction and application specification for mass customization

5. Customization of household electrical appliances

We suggest IEC to establish an organization to start the research on customization of household electrical appliances.

General research



- Establish the application case of customization
- analyze the difference between "traditional manufacturing" and "customization mode"
- Give guidance to the whole process of customization from the point of view of products and services

Key technology investigation



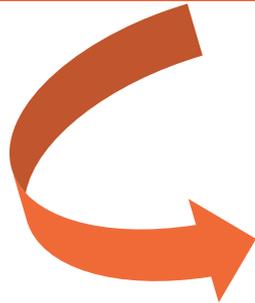
- Establish product quality knowledge base, and take use of simulation technology, then use online test to substitute the type tests.
- "knowledge-based" and modularization fast design methods
- Requirement management and product configuration technology

These research results can be used for reference in other fields of IEC.

5. Customization of household electrical appliances

Promoting the application of customization

reallocated production factors from low-value added manufacturing towards high-value added manufacturing and services.



SUSTAINABLE DEVELOPMENT GOAL 9

Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

Thank you for your attention