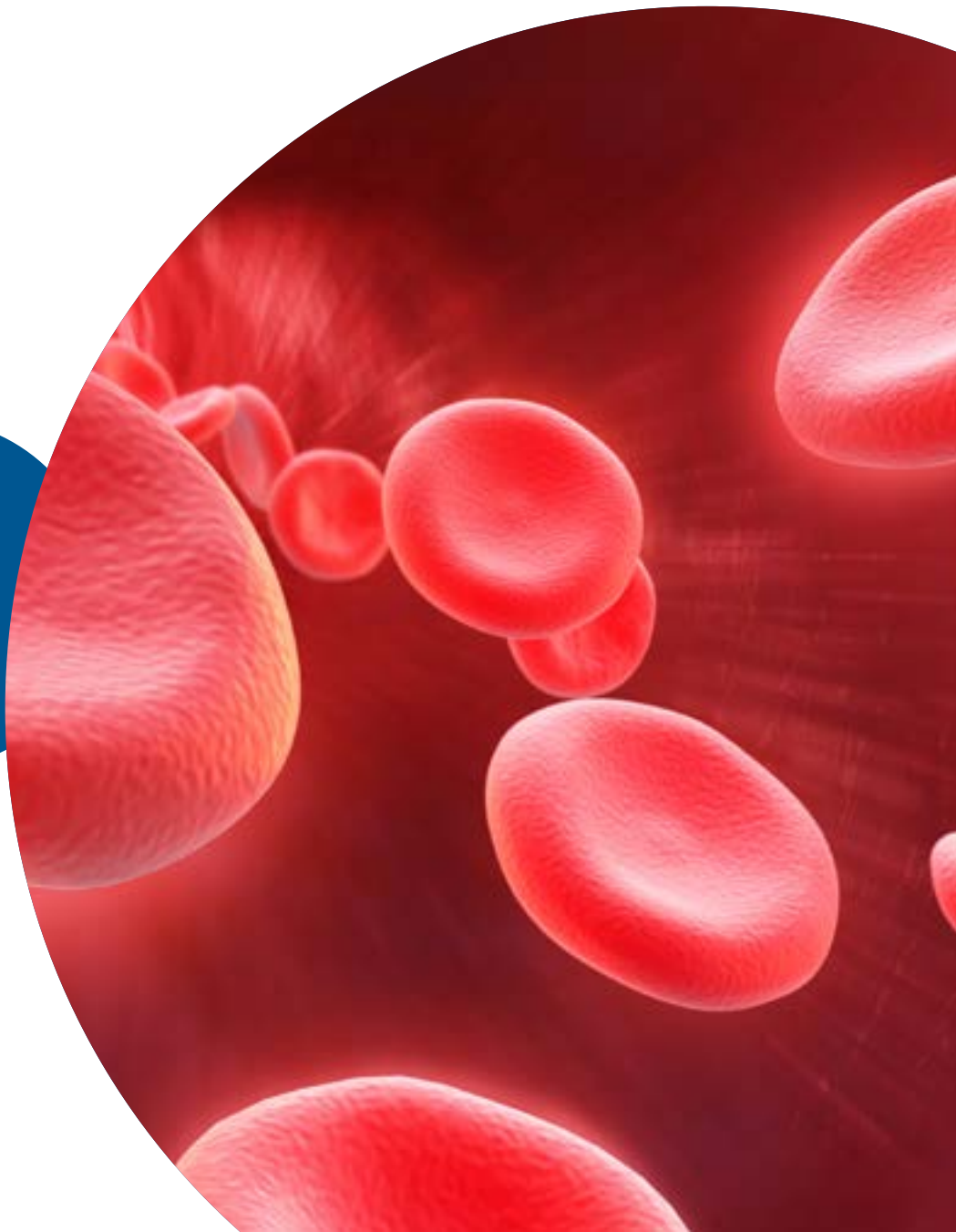
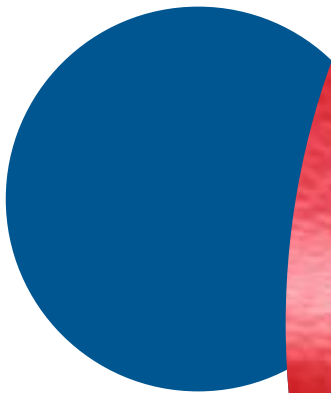
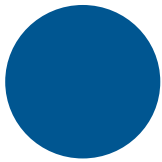




**BOSCH**

Invented for life

# The age old story of anemia and the untold story of a convenient, **non-invasive point of care diagnosis**



**Mr. Guruparasad S.**

Vice President & Director,  
Business area healthcare

**Ms. Madhumitha S.**

Strategy lead, Business  
area connected products

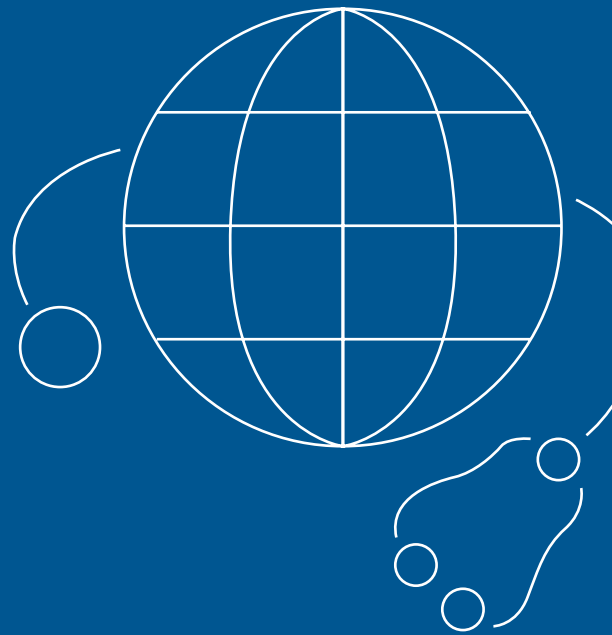
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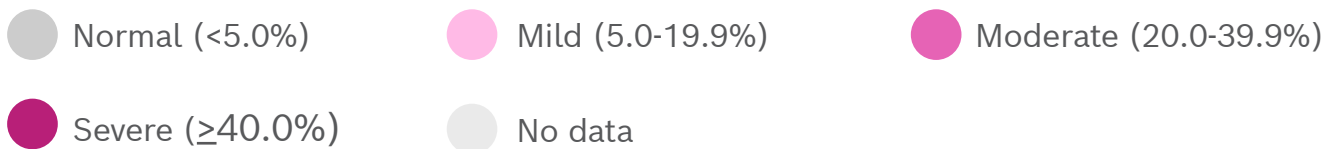
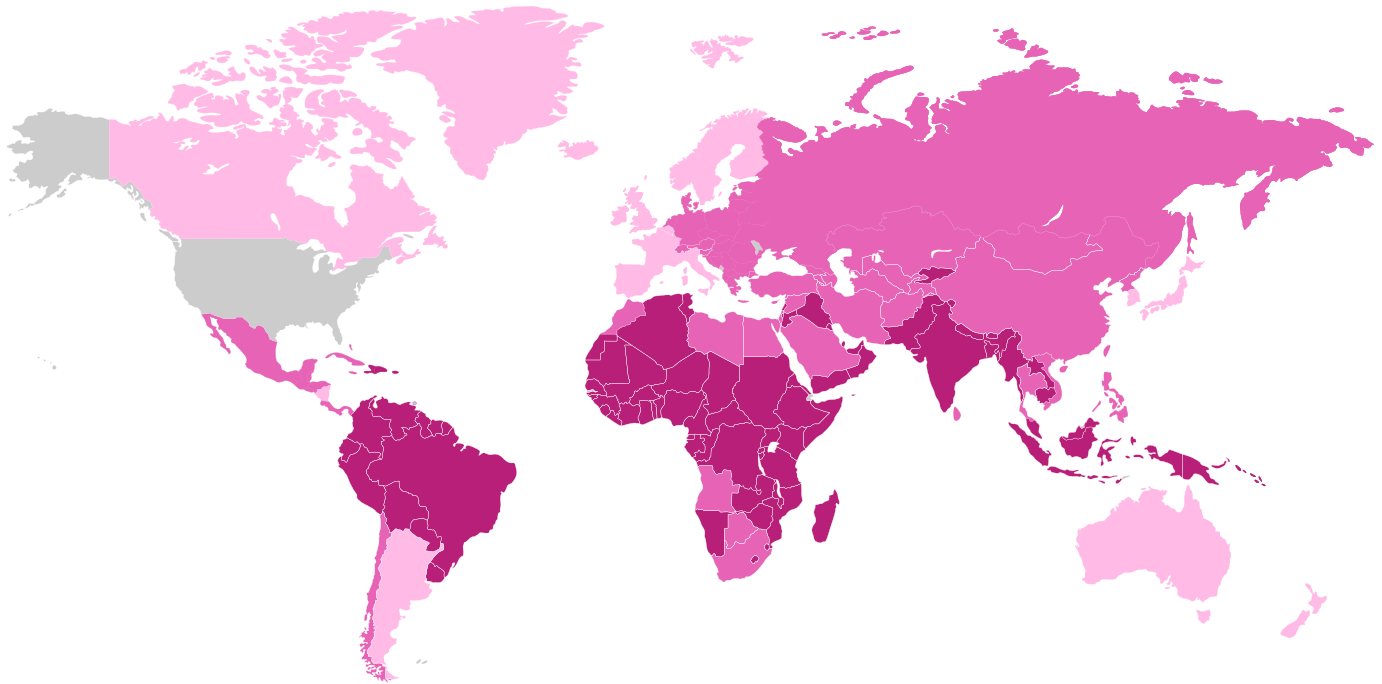
# ANEMIA IN THE GLOBAL LANDSCAPE

**1.6 BILLION** - according to the World Health Organization (WHO), that is the total number of people on this earth, who suffer from a condition called anaemia. That is close to 1 in 4 of the world's population. In addition, more than 1 million deaths annually are attributed to low hemoglobin levels (condition anemia). The prevention and treatment for nutritional iron deficiency remains tragically insufficient worldwide, even in this modern digital era. The problem is rather dire in underprivileged segments especially affecting women and children.

Developing countries already suffer from access to balanced nutrition and the recent pandemic of COVID-19 has only made things worse. In India alone, 2 out of 3 people suffer from some form of anemia. The United Nations Sustainable Development Goal for reduction in the prevalence of Anemia worldwide was still behind plan, COVID-19 has only made it worse.



# GLOBAL PREVALENCE OF ANEMIA



Source: <https://jmhg.springeropen.com/articles/10.1186/s43042-020-00114-z>



**1 million**

Mortality globally per year caused by anemia



**500 million**

People in India suffer from Anemia



**335 million**

Indian women are anemic

# EFFECT OF ANEMIA ON WOMEN'S HEALTH

Iron Deficiency Anemia (IDA) is twice as prevalent in females as in males and it is one of the most widely observed nutritional deficiency in women across the world. Several women of reproductive age suffer from it, often without even knowing so. The disease becomes especially problematic during pregnancy and is often a contributory cause of maternal death and poor fetal development. The impact of the disease is also notable. It leads to poor immunity levels, putting the affected population at risk to several other diseases like chronic fatigue and lethargy all the way till serious conditions like impaired cardiac function. Women in their reproductive years needs hematopoietic nutrients. With a lot of unpaid work burden on a woman taking care of the household, and her nutrition needs not being met, the vulnerability increases even further.





# CHALLENGES IN ANEMIA MANAGEMENT



One of the major reasons for late detection of anemia is that it can go undetected until an emergency situation or hospitalization brings the condition to the forefront. Although commonly prevalent, Anemia usually goes undetected, because of limited early detection and due to a lack of simple, monitoring solutions. The invasive and time-taking procedures for measuring hemoglobin levels don't help the cause either. Here are some of the major challenges in hemoglobin monitoring using traditional techniques:

## Accessibility



Traditionally, accurate hemoglobin level measurement calls for an elaborate laboratory ecosystem. While larger hospitals in the cities have in-house facilities, in rural areas, the presence of basic laboratory set-ups and pathology clinics is still dismal. In emerging economies, the burden of public health falls on the government and local administrators. Making diagnostic centers accessible to everyone still remains a herculean challenge.

## Invasive testing

Hemoglobin testing has traditionally been invasive and hence inconvenient. Such testing methods involve drawing of blood exposing the patients as well as care-givers to risks associated with needle pricking. Such testing also necessitates proper sanitizing mechanisms in place in order to prevent exposures to bio-hazards or infections. The procedure also becomes highly inconvenient for patients requiring repeated testing and monitoring of hemoglobin levels during the course of Anemia treatment.


## Reliability of tests



While non-invasive testing methods are emerging, the reliability and accuracy of these tests when compared with that of the invasive procedures has been questionable. Also, a lot of such devices are not highly sensitive in situations where hemoglobin levels are extremely low, and such patients are common in underdeveloped and developing countries.

## Turnaround Time

Like any other blood test, hemoglobin diagnosis takes time. The turnaround time increases even more if the samples have to be sent to some distant laboratory for testing, which is the case in rural and remote areas. This further delays the decision-making of the healthcare professional and leads to multiple iterations of patient-physician interactions till a treatment plan could be evolved.



Bottom line, there needs to be a reliable, non-invasive, quick detection and intervention mechanism in place in order to tackle the burden of anemia.

# THE SOLUTION: BOSCH HEMOGLOBIN MONITOR SOLUTION

The Bosch Hemoglobin Monitor Solution (HMS) enables rapid point-of-care hemoglobin testing where a user simply places their finger on the device and receives results almost instantaneously. This non-invasive, painless approach with zero infection promise facilitates anemia classification and hemoglobin value prediction and ensures control is directly in the hands of the user.

## A smart, non-invasive, point of care screening device



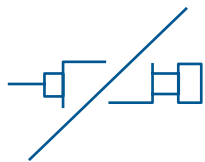
### HMS hb

Powered with Hemoglobin level classification

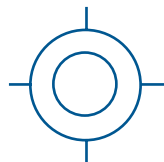


### HMS hb+

Powered with Hemoglobin value prediction



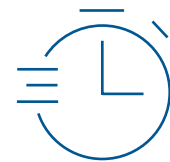
Non-invasive



High-precision



Connected



Approx <30 sec for results

## Overcoming the issue of accessibility with portability

The Bosch HMS is portable and convenient to use. Medical practitioners do not need a full-fledged laboratory in order to get to know the hemoglobin levels of the patient. With its hand-held design, it can be operated from anywhere, anytime. Further, the network connectivity options for data transfer and an in-built battery ensure convenience and ease-of-use.

## The beauty of non-invasive diagnosis

When we think of hemoglobin level measurement, we usually think of a probe, a needle and possibly a computer that analyses the blood sample. However, Bosch HMS is a non-invasive solution without any complications of invasive testing and is completely painless. Its smart functionality includes a safe finger-resting slot, light-up feedback, and smart digital display for simple understanding of results. This set-up makes HMS safe and free from any risks of cross-infection.

## Quick analysis in less than 30 seconds



Most current hemoglobin level measurement services take anywhere between a few hours to days to give results. And so, the healthcare practitioners have to wait before prescribing any corrective medicine or treatment recommendation. Bosch HMS cuts down the waiting time for lab reports drastically and helps to get results on-the-spot within 30 seconds.

## High-precision smart reporting



Bosch HMS uses in-built artificial intelligence driven machine learning algorithms. The underlying working principle of the solution is based on multi wavelength spectro-photometry. Comprising of micro-electronics with embedded intelligence, it is designed as a compact solution for reliable reporting. The device has proven sensitivity even for low hemoglobin concentrations. Additionally, the advanced IoT enabled connectivity for remote device management enables significant reduction in device down-times.

## Easy on the pocket

This advanced solution is affordable and also helps the patients save on any recurring costs arising out of test consumables. In the last decade, several approaches towards a non-invasive estimation of hemoglobin have been proposed. Most of these solutions are tied up with a consumable based business model making them prohibitive for mass consumer adoption. Bosch solution with no additional consumables ensures affordability and easy usage models.


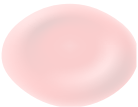
## Value-added offerings



The HMS is handy for any government or local administrator because it captures geospatial information and integrates it easily for effective population health management. Besides HMS also offers digital health records and uses heat maps for smart reporting. Data driven value added services like remote device management, secure storage and transfer of health data add to the host of benefits that this solution offers

## Reliability at its core

The solution has double digit patents filed as of today, covering hardware, algorithm and user experience design. It has also won the prestigious European Product Design Award (EPDA 2020) and Consumer Electronics Show (CES 2021) Innovation Awards, highlighting its design as well as its practical benefits.







Portable and handheld device



Easy and convenient to use



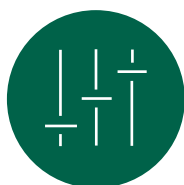
Easy integration for population health management



Machine learning algorithm



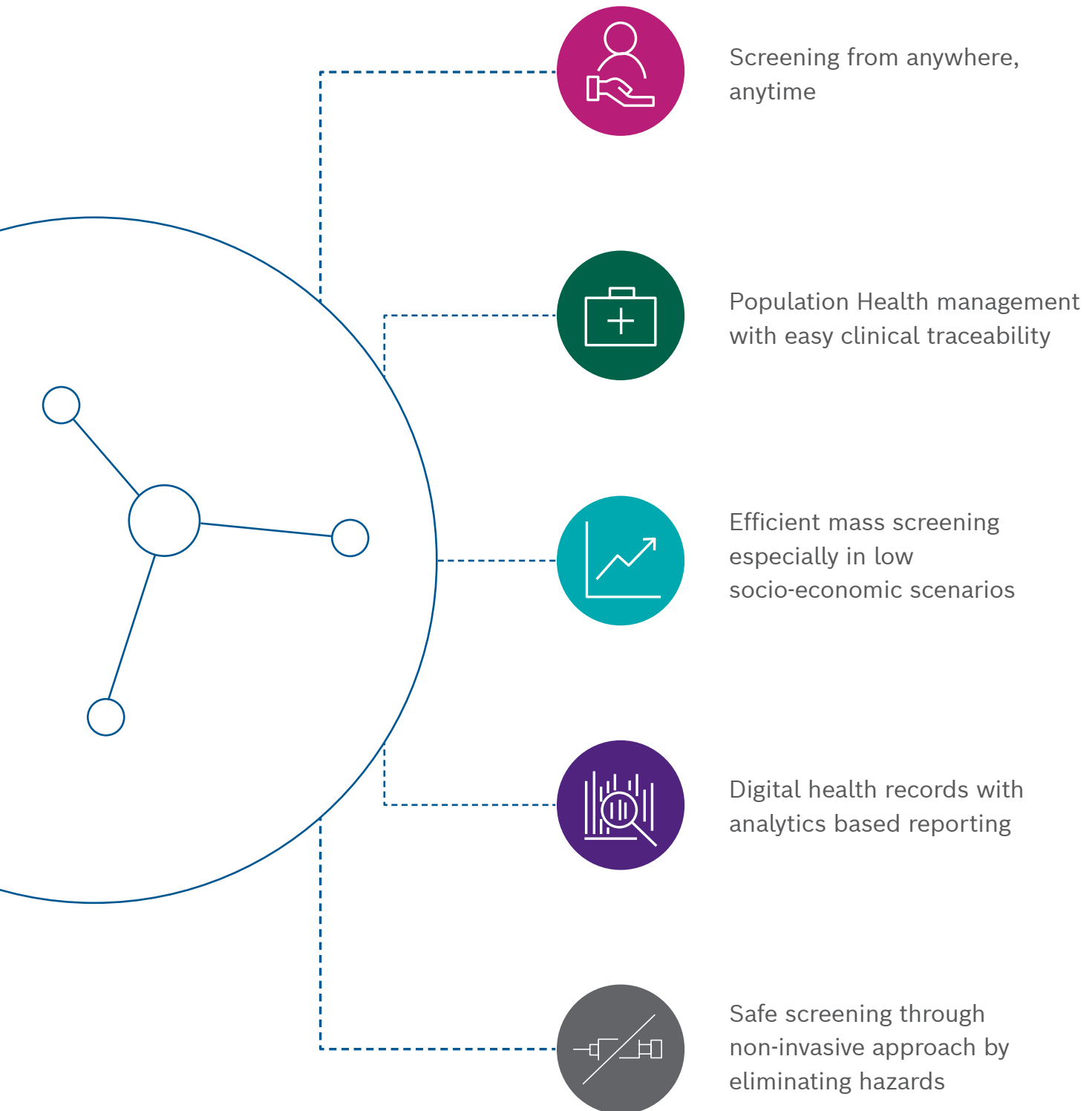
Anemia classification, hemoglobin value prediction



High sensitivity even at low hemoglobin levels



# BOSCH HEMOGLOBIN SOLUTION: A GAME CHANGER IN ANEMIA SCREENING & MANAGEMENT



# HOW AN ADVANCED HEMOGLOBIN MONITORING SOLUTION WILL BENEFIT THE HEALTHCARE ECOSYSTEM

The simplified, point-of-care and non-invasive solution has the potential to bring a paradigm shift in hemoglobin screening and management and can play a major role in reducing the global anemia burden. It can be instrumental in a variety of practical use-cases:

## Government Establishments and Local Administrators

Local administrators often have nutrition-related goals for their districts. Accredited Social Health Activists (ASHA workers) in India could use this device to monitor anemia in a given population sample. This would help understand area-wise nutrition levels and steps can be then taken to improve the health of the general population.



## Mass screening in rural places

Mass screenings are particularly helpful in discovering latent conditions and anemia happens to be one of the leading conditions of the same. Regular mass screenings can help ensure timely detection of nutritional deficiencies so that targeted corrective actions can be implemented by the authorities.

The point-of-care innovation is especially designed for making diagnostics accessible to people living in remote regions and rural places. Portability of the device and immediacy of test results makes it the perfect solution for large-scale screening setups.



## General Practitioners and Hospitals

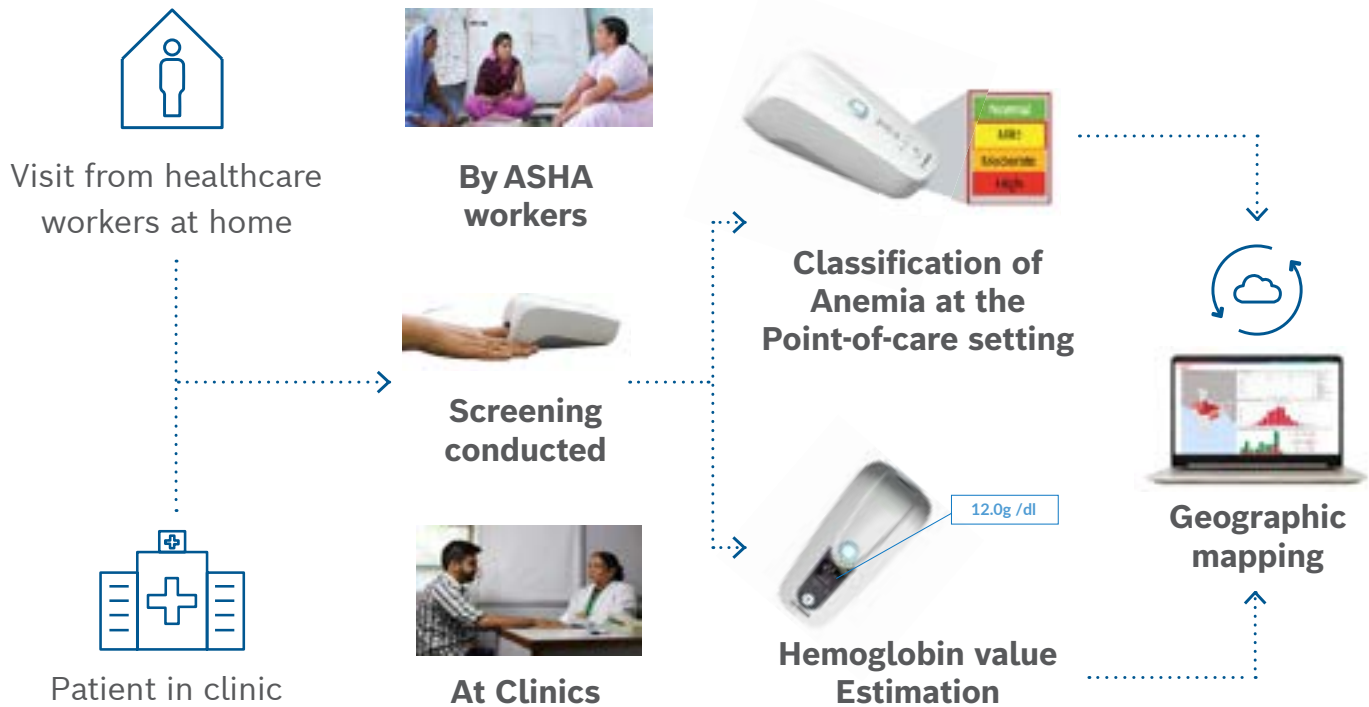
For general practitioners who need reliable and periodic hemoglobin monitoring, Bosch HMS could be a smart option that can sit on their desks and be readily available whenever they need to monitor walk-in patients' hemoglobin levels. Corporate hospitals can also offer a better experience to their patients by including hemoglobin test in their initial patient screening protocols.



# Home Testing by Private Clinics and Diagnostics Labs



We are living in an era of ‘everything-from-home’. In times like these where hospitals could be a breeding ground for infection spread, people are wanting to get their tests done from the comfort and safety of their own homes. A portable solution could be very useful for diagnostic labs and clinics looking to offer ‘at-home’ services to the patients.



## Blood Banks

Blood banks often tie up with corporates and NGOs to hold Blood donation drives. Anyone below normal hemoglobin levels should ideally not be allowed to donate. But it becomes quite a tedious process to filter out ideal donors in camps like these. An advanced monitoring tool could help carry out this process in a hassle-free manner.



## Schools

Anemia is a condition that can be nipped in the bud, with early detection and intervention. A portable and quick device allows schools to organize regular health camps to monitor levels of anemia among their students and raise a flag to parents as and when required.



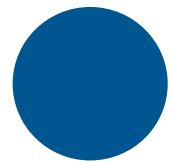
## Chronic and Critical diseases

Invasive testing adds to the pain of patients suffering from chronic conditions which calls for routine treatment and therapies. Treatments like chemotherapy and dialysis require regular monitoring of hemoglobin as part of their treatment protocol. Bosch HMS can be a much-needed reprieve for both the patients and the healthcare workers. With its reliability beyond question, a solution like Bosch HMS can put both the doctor and the patient at ease.



## Chronic internal bleeding

One of the best ways of identifying internal bleeding is to check the hemoglobin levels without invasion. Also a quick turnaround time helps the cause - the doctors can immediately perform needed interventions without the delay of waiting for the report.



# ONE STEP CLOSER TOWARDS AN ANEMIA-FREE WORLD

Early intervention has been time-and-again identified as one of the key factors for successful anemia control. And only when diagnostics becomes simpler and complication-free, can testing frequency and scale be increased. Bosch HMS, with its non-invasive, reliable, patented, point-of-care, award winning innovation has established a precedent in the right direction. It is only a matter of time before other innovators catch up and bring about pain-free, patient friendly, accessible diagnosis for other medical conditions as well. With an overarching motivation to nurture overall health and wellness of society, we could soon witness laboratory grade solutions in the palms of the consumers.





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# Get In Touch

Robert Bosch Engineering and Business Solutions PVT. LTD.

India | USA | Europe | UK | Japan | Middle East | China

For more information, send your enquires to  
[connect@in.bosch.com](mailto:connect@in.bosch.com)

