

# E-health Initiatives for Screening and Management of Anemia in Rural Rajasthan



Shweta Mangal<sup>1\*</sup>, Disha Mangal<sup>2</sup>, Ashok Kumar<sup>3</sup>, Raja Babu Panwar<sup>4</sup>

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## ABSTRACT

**Introduction:** Anemia is considered to be a public health issue of serious concern universally. In the current era of advancing technology, electronic health (e-health) initiatives are being employed in various health programs for disease screening and management. This study was planned to screen for anemia and manage it through a multidimensional approach comprising iron folic acid (IFA) supplementation, deworming among children, and dietary guidance and health education through pop-up videos with the aid of e-health initiatives.

**Methods:** This was a prospective cohort study. An Android e-application (app) was used on tablets to identify anemia after hemoglobin estimation through the Hemoglobin Color Scale. Accredited Social Health Activists (ASHAs) managed anemia by providing health education and dietary guidance through pop-up videos and IFA supplementation. Statistical analysis was done using the Statistical Package for the Social Sciences (SPSS) version 29. Tests of significance in the form of Cochran's Q, McNemar, chi-square, and repeated measures analysis of variance (ANOVA) and independent *t*-test were applied.

**Results:** The overall prevalence of anemia significantly declined from 46.08% at baseline to 14.65% at the 9th month. Males had a higher anemia prevalence (52.8%) compared to females (39.16%). An overall improvement of 68.2% was observed in the anemia status, with the maximum being in the 1–5-year age-group and females. Mean hemoglobin levels showed a consistent increase across all age-groups, with the maximum being in the 6-month–1-year age-group and females.

**Conclusion:** This study demonstrated that community-based, sustained, and targeted strategies through the use of e-health initiatives can effectively combat anemia and achieve significant improvements in hemoglobin levels across all age and gender groups.

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## INTRODUCTION

A low number of red blood cells or hemoglobin concentration below normal is defined as anemia as per the World Health Organization (WHO). Anemia is considered to be a public health issue of serious concern globally. Young children, menstruating adolescent girls and women, and pregnant and postpartum women are at a higher risk of being affected. WHO estimates that children aged 6–59 months, pregnant women, and reproductive-age women suffer from anemia globally in high proportions (40, 37, and 30%, respectively).<sup>1</sup>

Anemia is also widely prevalent in India. Despite a number of government health programs and policies ongoing for a long time, the reports of National Family Health Survey (NFHS)-5 declared a large proportion of the population to be anemic. According to NFHS-5, 57% of reproductive-age women and 25% men were found to be anemic in India, while in the state of Rajasthan, 54.4% women and 23% men were reported to be anemic. These figures were higher in children aged 6–59 months, among whom 67.1% were anemic in India overall and 71.5% in the state of Rajasthan.<sup>2,3</sup>

A multidimensional approach comprising nutrient supplementation, food fortification, prevention and control of parasitic and protozoal infestations, and health education has been endorsed by WHO and United Nations Children's Fund (UNICEF) for the control and prevention of anemia. It has been proven that iron supplementation can prevent <12,500 disability-adjusted life years (DALYs) per year in regions with modest mortality rates, such as the European subregion, to almost 2.5 million DALYs in areas with high adult and child mortality rates, such as in the African and Southeast Asian subregions.<sup>4</sup>

The interventions and strategies, whether for diagnosis or management, are incomplete without the use of e-health in today's era. WHO defines e-health as the use of information and communication technologies for health. Equipping grassroots workers and the use of e-health initiatives have been proven to be beneficial for a number of noncommunicable diseases such as hypertension and diabetes in various studies.<sup>5–7</sup>

Thus, we conducted this research intending to assess anemia prevalence and the effect on anemia after giving 3 months of iron folic acid (IFA) supplementation twice, along with

deworming among children and dietary guidance and health education through pop-up videos with the aid of e-health initiatives.

## METHODS

This was a prospective cohort study funded by Rajasthan University of Health Sciences, Jaipur, and was approved by the ethics committee of the medical college.

Two villages, Lakhesra and Kapoorawala near Jaipur, with difficult access and inadequate health services, were identified for the study. A population of 3,830 individuals above 6 months of age was included in the study. We communicated with Accredited Social Health Activists (ASHAs) in the selected area. Two ASHAs were recognized from each village who consented to work for data collection and follow-up of recruited subjects in the project. Data collection was completed in a year.

An Android e-application (app) was worked on, usable on tablets. The cardinal features were global positioning system (GPS), Skype, and 3G enabled, which helped in live data accumulation and visibility of data at the central location. An essential feature of the app was automatic conveyance of data to a central location.

Pop-up videos on the application, which was an inbuilt feature, could be used for counseling on the assessed problem. These would appear spontaneously for health education on the identification of the risk. For example, for those diagnosed with anemia, a pop-up video would appear on a tablet to be shown to the concerned person about

<sup>1</sup>Professor, Department of Community Medicine, Mahatma Gandhi University of Medical Sciences and Technology; <sup>2</sup>Intern Doctor, Department of Community Medicine, RUHS College of Medical Sciences; <sup>3</sup>Statistician and Assistant Professor, Department of Community Medicine, Mahatma Gandhi University of Medical Sciences and Technology; <sup>4</sup>Former Vice Chancellor, Department of Cardiology, Rajasthan University of Health Sciences, Jaipur, Rajasthan, India; \*Corresponding Author

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the adverse effects of anemia and health education related to it. ASHAs were trained to perform hemoglobin estimation through the Hemoglobin Color Scale (HbCS). The HbCS compares the color of a blood drop, which is absorbed on special chromatography paper. Comparison is done with standard colors on a laminated card, which are displayed in increments of 2 gm/dL. The HbCS has five colors: blood red, barn red, crimson red, firebrick, and Persian red.

Accredited Social Health Activists were trained to perform hemoglobin estimations through training modules and real-time demonstrations using the HbCS. WHO guidelines were used for anemia, which were already fed into the e-application.

Written informed consent was taken from all the heads of the families and participants before recruitment. Collection of baseline data was done by ASHAs in 3 months. For all anemic subjects above 6 months of age, 3 months of IFA, deworming (children), dietary guidance, and health education through pop-up videos in the e-application were done. The hemoglobin estimation was done after 1 month of completion of the course to see the effect. Those who were still anemic were given another 3 months of IFA, and hemoglobin assessment was done after 1 month of completion of the second course.

Those in the age-group of 6 months to 6 years were given liquid formulations of IFA (20 mg elemental iron and 0.1 mg folic acid), while children up to the age of 10 years were given a pediatric dose of IFA (30 mg elemental iron and 250 µg of folic acid per day), along with deworming in all of them. Adolescents and adults were given the adult dose, i.e., 100 mg elemental iron and 0.5 mg folic acid.

### Data Collection

The data were transferred directly to the central computer, and reports on various

aspects were generated automatically daily through entries in e-application usable on tablets.

### Statistical Analysis

Statistical analysis was done using the Statistical Package for the Social Sciences (SPSS) version 29 in the form of percentage, mean, standard deviation, and tests of significance in the form of Cochran's Q, McNemar, chi-square for qualitative data, and repeated measures analysis of variance (ANOVA) and independent *t*-test for quantitative data.

## RESULTS

A total of 3,830 individuals were included in the study from two villages to assess anemia prevalence and the effect on anemia after follow-up at 5 and 9 months after giving 3 months of IFA treatment twice, along with deworming among children and dietary guidance and health education through pop-up videos in an e-health application.

### Distribution of Anemia by Age-group

At baseline, the overall prevalence of anemia was 46.08% (1,765/3,830), which significantly declined to 21.36% at the 5th month and further to 14.65% at the 9th month. The highest anemia prevalence at baseline was observed among the 6-month–1-year age-group (53.09%), while the lowest was among the 5–15 years age-group (40.32%). Change in the number of total anemics at the start and end was found to be statistically significant, as per Table 1.

The greatest improvement in the number of anemics was seen in the 1–5 years group, where prevalence dropped from 46.04 to 10.73%, reflecting a 76.7% change. Conversely, the smallest improvement was in the above

60-year age-group (53.51% change), as evident in Table 1.

The difference in anemia status across three time points in all age-groups was noted and was statistically significant ( $p < 0.001$ ). Change between two specific time points showed significant change in all age-groups in anemia status from baseline to first follow-up at 5th month and baseline to second follow-up at 9th month. But it was not significant in the extreme age-groups, i.e., 6 months to 1 year and above 60-year age-group, from 1st follow-up to the second follow-up, as shown in Table 1.

### Distribution of Anemia by Gender

Of the 1,943 males, 52.8% were anemic at baseline, which reduced at 5 months and 9 months, showing an overall 59.85% change. Among females ( $n = 1,887$ ), baseline anemia was lower at 39.16% and showed a greater overall improvement (79.85%), as per Table 2.

The difference in anemia status across the three time points in both genders was statistically significant ( $p < 0.001$ ). Also, change across all two time points was significant ( $p < 0.001$ ).

### Change in Mean Hemoglobin across Age-groups

Mean hemoglobin levels showed a consistent increase across all age-groups from baseline to the 5th and 9th months. The mean hemoglobin increased at two follow-ups, as per Table 3, and the difference observed in mean hemoglobin across age-groups at all three time points was found to be statistically significant ( $p < 0.001$ ). Figure 1 shows the comparison of mean hemoglobin level at baseline, at the 5th month, and at the 9th month using a line plot. From the figure, we observe a high improvement in mean hemoglobin level at the two follow-ups.

**Table 1:** Distribution of anemics as per age-group at start and after F/U5, F/U9 with change in anemia status

Age-group in years	N	Anemia status at start n (%)	Anemia status at F/U 5th month n (%)	Anemia status at F/U 9th month n (%)	Change in status (%)	<i>p</i> -value, Cochran's Q (across three time points)
6 month–1	81	43 (53.09)	22 (27.16)	17 (20.99)	60.46	<0.001
1–5	354	163 (46.04)	66 (18.64)	38 (10.73)	76.7	<0.001
5–15	811	327 (40.32)	167 (20.59)	116 (14.3)	64.53	<0.001
15–45	1,969	915 (46.47)	415 (21.08)	275 (13.97)	69.93	<0.001
45–60	389	203 (52.18)	90 (23.14)	62 (15.94)	69.45	<0.001
Above 60	226	114 (50.44)	58 (25.66)	53 (23.45)	53.51	<0.001
Total	3,830	1,765 (46.08)	818 (21.36)	561 (14.65)	68.21	<0.001

The difference in anemia status across the three time points in all age-groups was statistically significant ( $p < 0.001$ , Cochran's Q test).

Change between two specific time points showed significant change in all age-groups in anemia status from baseline to first follow-up at the 5th month and baseline to second follow-up at the 9th month ( $p < 0.001$ , McNemar test).

But it was not significant in the extreme age-groups, i.e., 6 months to 1 year and above 60-year age-group from the first follow-up to second follow-up ( $p = 0.131$  and  $p = 0.302$ , respectively).

Change in the number of total anemics at the start and end was found to be statistically significant ( $\chi^2 = 23.36$ ,  $df = 1$ ,  $p < 0.001$ ).

**Table 2:** Distribution of anemics as per gender at the start and after F/U 5th month, 9th month with change in anemia status

Gender	N	Anemia status at start n (%)	Anemia status at F/U at 5th month n (%)	Anemia status at F/U at 9th month n (%)	Change in status (%)	p-value, Cochran's Q (across three time points)
Male	1,943	1,026 (52.8)	555 (28.56)	412 (21.20)	59.85	<0.001
Female	1,887	739 (39.16)	263 (13.94)	149 (7.89)	79.85	<0.001
Total	3,830	1,765 (46.08)	818 (21.36)	561 (14.65)	68.21	<0.001

The difference in anemia status across the three time points in both genders was statistically significant ( $p < 0.001$ , Cochran's Q test). Also, change across all two time points was also significant ( $p < 0.001$ , McNemar test).

**Table 3:** Change in mean Hb across various age-groups

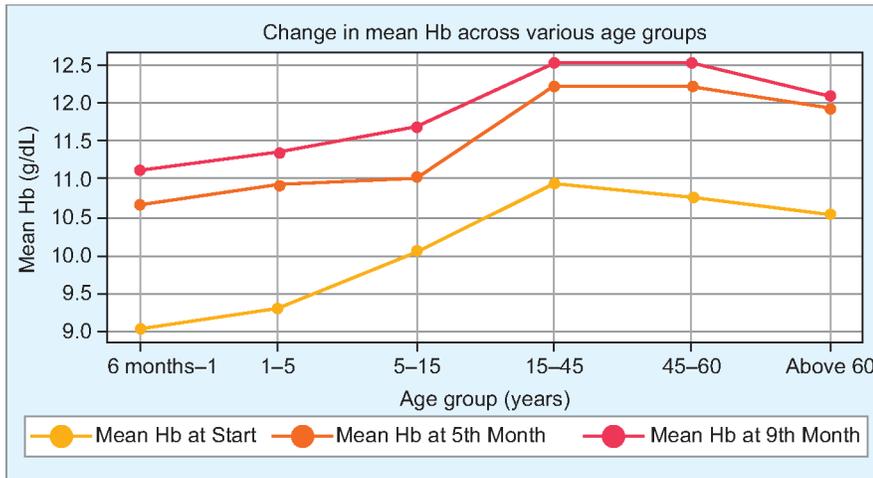
Age-group in years	N	Mean Hb $\pm$ SD at start	Mean Hb $\pm$ SD at F/U 5th month	Mean Hb $\pm$ SD at F/U 9th month	Mean difference from start to end
6 month-1	43	9.05 $\pm$ 1.56	10.67 $\pm$ 1.58	11.12 $\pm$ 1.14	2.12
1-5	163	9.32 $\pm$ 1.15	10.92 $\pm$ 1.43	11.35 $\pm$ 0.91	2.03
5-15	327	10.05 $\pm$ 0.85	11.02 $\pm$ 1.31	11.68 $\pm$ 0.94	1.63
15-45	915	10.94 $\pm$ 1.07	12.23 $\pm$ 1.09	12.52 $\pm$ 0.92	1.58
45-60	203	10.78 $\pm$ 1.08	12.21 $\pm$ 1.19	12.52 $\pm$ 0.96	1.74
Above 60	114	10.54 $\pm$ 1.08	11.95 $\pm$ 1.18	12.09 $\pm$ 1.04	1.55
Total	1,765	10.53 $\pm$ 1.20	11.82 $\pm$ 1.33	12.19 $\pm$ 1.04	1.66

The difference in Hb level across the three time points in all age-groups was statistically significant (one-way repeated measures ANOVA,  $df = 2, p < 0.001$ ).

**Table 4:** Change in mean Hb across various gender groups

Gender	N	Mean Hb $\pm$ SD at start	Mean Hb $\pm$ SD at F/U 5th month	Mean Hb $\pm$ SD at F/U 9th month	Mean difference from start to end
Male	1,026	11.01 $\pm$ 1.21	12.13 $\pm$ 1.35	12.50 $\pm$ 1.08	1.49
Female	738	9.88 $\pm$ 0.81	11.41 $\pm$ 1.16	11.77 $\pm$ 0.83	1.89
Total	1,764	10.53 $\pm$ 1.2	11.82 $\pm$ 1.33	12.19 $\pm$ 1.04	1.66

Both genders had improved Hb levels at follow-ups, more so among females, and this observed difference was statistically significant (independent  $t$ -test,  $t = -6.04, df = 1762, p < 0.001$ ).



**Fig. 1:** Comparison of mean Hb level in different age-groups across different time periods

### Change in Mean Hemoglobin across Genders

Males had a higher baseline mean hemoglobin compared to females. At the second follow-up at the 9th month, males and females both had improved hemoglobin levels, more so among females, and this observed difference was statistically significant ( $p < 0.001$ ), as per Table 4.

### DISCUSSION

This study demonstrated that community-based strategies through the use of e-health initiatives can effectively combat anemia and bring about significant improvements in hemoglobin levels across all age and gender groups by raising awareness and improving adherence to iron supplementation. Similar

results were found across various studies among pregnant women and adolescent girls using e-health.<sup>8-11</sup> The results in the form of improvement of the disease condition by e-health initiatives are in line with various other studies using e-health for various health conditions.<sup>6,7,12-14</sup>

This study assessed the prevalence and longitudinal changes in anemia across various age and gender groups following a comprehensive community-based intervention. A significant reduction in anemia prevalence was noted over a 9-month follow-up, from 46.08% at baseline to 14.65%, indicating the potential effectiveness of ongoing interventions such as IFA supplementation, dietary guidance, health education, and deworming. It also highlights that targeted, sustained interventions can improve hemoglobin status in resource-limited settings.

According to the NFHS-5 (2019-2021),<sup>2</sup> anemia prevalence in children aged 6-59 months was 67.1%, in women aged 15-49 years was 57%, and in men aged 15-49 years was 25%. Compared to NFHS data, the baseline prevalence observed in this study

is somewhat lower, possibly due to better coverage, a smaller community, and health awareness among the studied population. This is also evident by better antenatal care (ANC) in the studied area. However, the direction of improvement in hemoglobin status mirrors national efforts like Anemia Mukht Bharat.

The results also contrast with recent NFHS-5 data showing worsening trends in national anemia levels, particularly in children and women.<sup>2</sup> This indicates that while national programs are well-designed, challenges in implementation may limit their impact. In contrast, localized programs with structured follow-up, such as the one in this study, may be better poised to deliver impact.

Younger children (6 months–1 year and 1–5 years) and elderly individuals (above 60 years) showed the highest baseline anemia rates, which is consistent with the known vulnerability of these groups due to factors such as poor dietary intake, higher physiological needs, and comorbidities. Encouragingly, all age-groups demonstrated improvement by the 9th month, with the most substantial change seen in children aged 1–5 years (76.7%). This is consistent with findings from global and Indian studies indicating that children under five are highly responsive to iron interventions. A meta-analysis by Sachdev et al.<sup>15</sup> confirmed that iron supplementation significantly reduces anemia and improves hemoglobin levels among children aged 6–59 months, especially when delivered consistently and combined with deworming and dietary advice. A study by Kapil and Bhavna<sup>16</sup> evaluating anemia control programs in India also reported moderate improvements in anemia status following nutritional supplementation and deworming, particularly among children and pregnant women.

In the current study, all age-groups showed improvement, though the oldest group (>60 years) demonstrated the least change (53.5%). This finding is consistent with research by Chaves et al.,<sup>17</sup> who reported that anemia in elderly populations is often multifactorial—stemming from chronic disease, malnutrition, and inflammatory conditions—which makes it less responsive to standard iron therapy alone. Addressing anemia in older adults may require a more comprehensive diagnostic and management approach, echoing results from the global review by Balarajan et al., who stressed the complexity of anemia in older adults and the need for specialized care beyond iron supplementation.<sup>18</sup>

Although the reduction from baseline to the 5th month was not statistically significant across age-groups, the difference became significant at the 8th month. This suggests that

longer follow-up durations may be necessary to observe meaningful improvements in hemoglobin levels and anemia status. It also reinforces the importance of sustained interventions and monitoring over time.

Gender-based analysis revealed a higher initial prevalence of anemia among males (52.8%) compared to females (39.2%), which contrasts with most literature indicating that females, especially of reproductive age, are more affected due to menstruation and pregnancy-related losses.<sup>19</sup> Nevertheless, the greater improvement observed in females (to just 7.89% by 2nd follow-up) likely reflects the benefit of focused programs and improved health-seeking behaviors in female groups as observed with improved ANC in the studied area, which showed among pregnant women IFA consumption, tetanus toxoid (TT) vaccination, and required ANC and postnatal care (PNC) visits were 100%. Also, Janani Suraksha Yojana (JSY) registration was >78%. Bentley and Griffiths<sup>19</sup> previously emphasized the need for gender-sensitive anemia control programs, which may explain this encouraging trend in female improvement.

Further support comes from a recent school-based intervention by Pande et al., where adolescent girls receiving weekly IFA supplementation showed an average increase in hemoglobin of 0.6 gm/dL over just 3 months.<sup>20</sup> Our study recorded a larger increase (1.66 gm/dL) over 8 months, suggesting that longer follow-up and possibly better compliance monitoring may enhance outcomes.

A pragmatic cluster-randomized trial in Karnataka found that integrating community health workers with iron supplementation significantly improved hemoglobin levels and reduced anemia burden more than iron therapy alone.<sup>21</sup> This aligns with our findings and reinforces the effectiveness of integrated, community-led health models.

The significant rise in mean hemoglobin levels across all age and gender groups further supports the effectiveness of interventions. The average hemoglobin improved from 10.53 gm/dL to 12.19 gm/dL overall, with the greatest gains seen in younger children and adult females. The statistically significant differences in mean hemoglobin values across both age and gender groups at all follow-up points ( $p < 0.001$ ) confirm that the observed changes were not by chance.

Our findings on mean hemoglobin changes also align with those reported by Kaur et al.,<sup>22</sup> who found that a school-based iron supplementation program led to an increase of 1.5 gm/dL in mean hemoglobin levels over 6 months among adolescents. In our study, the mean hemoglobin improved by 1.66 gm/dL across the total population

over 8 months. The significant gains across all age-groups and genders underscore the efficacy of sustained public health measures.

## CONCLUSION

This study demonstrated that community-based, sustained, and targeted strategies through the use of e-health initiatives can effectively combat anemia and achieve significant improvements in hemoglobin levels across all age and gender groups. The best outcomes were observed in children aged 1–5 years and in females, highlighting the responsiveness of these groups to well-structured interventions. Although older adults showed smaller gains, these findings support the scalability of such models within national programs like Anemia Mukht Bharat. Further research is needed to explore factors affecting persistent anemia in the elderly and ensure long-term adherence to interventions.

This study has several strengths, including a large sample size and comprehensive follow-up, but it also has limitations. Socioeconomic variables, dietary patterns, and comorbidities were not evaluated, which could have influenced outcomes. Also, further evaluation for hemoglobinopathies was beyond the scope of this study. Future studies incorporating these aspects could provide deeper insights into anemia control.

## ORCID

Shweta Mangal  <https://orcid.org/0000-0001-9658-2006>

Disha Mangal  <https://orcid.org/0009-0008-3685-7993>

Ashok Kumar  <https://orcid.org/0009-0009-1724-4881>

Raja Babu Panwar  <https://orcid.org/0009-0008-0476-1575>

## REFERENCES

1. World Health Organization. Anaemia. Available from: <https://www.who.int/health-topics/anaemia>. [Last accessed January, 2026].
2. Ministry of Health and Family Welfare (MoHFW), India. National Family Health Survey (NFHS-5), 2019–21. Available from: [https://www.mohfw.gov.in/sites/default/files/NFHS-5\\_Phase-II\\_0.pdf](https://www.mohfw.gov.in/sites/default/files/NFHS-5_Phase-II_0.pdf)
3. Press Release: Press Information Bureau. Ministry of Health and Family Welfare, Anaemia Mukht Bharat. Available from: <https://www.pib.gov.in>. [Last accessed January, 2026].
4. Baltussen R, Knai C, Sharan M. Iron fortification and iron supplementation are cost-effective interventions to reduce iron deficiency in four subregions of the world. *J Nutr* 2004;134:2678–2684.
5. Mangal S, Sharma R, Fatima A, et al. Technology empowerment of ASHA workers using e-health initiatives in rural Rajasthan. *Healthline* 2023;14(4):276–281.
6. Mangal S, Gupta K, Malik M, et al. E-health initiatives for screening and management of diabetes in rural Rajasthan. *Int J Diabetes Dev Countries* 2022;42(3):459–464.

7. Mangal S, Baig VN, Gupta K, et al. e Health initiatives for screening and management of hypertension in Rural Rajasthan. *J Family Med Prim Care* 2021;10(12):4553–4557.
8. Rahman MJ, Rahman MM, Kakehashi M, et al. Impact of eHealth education to reduce anemia among school going adolescent girls in rural Bangladesh: study protocol of a randomized controlled trial. *J Family Med Prim Care* 2023;12:2569–2575.
9. Shao Y, Meng C, Liang Y-Z. Digital versus non-digital health interventions to improve iron supplementation in pregnant women: a systematic review and meta-analysis. *Front Med (Lausanne)* 2024;11:1375622.
10. Rahman MJ, Rahman MM, Rahman MH, et al. Impact of mobile health-based nutritional education on hemoglobin levels in anemic adolescent girls in rural Bangladesh: a randomized controlled trial. *BMC Public Health* 2025;25:2567.
11. Malik M, Panwar VR, Mangal S, et al. Effect of mHealth, interactive voice response system (IVRS) on maternal and fetal outcomes. *RUHS J HealthSci* 2023;8(4):199–206.
12. Arsad FS, Soffian SS, Kamaruddin PS, et al. The impact of eHealth applications in healthcare intervention: a systematic review. *J HealthRes* 2023;37(3):178–189.
13. Fonseca MH, Kovaleski F, Picinin CT, et al. E-Health practices and technologies: a systematic review from 2014 to 2019. *Healthcare* 2021;9,1192.
14. Kaur S, Kaur R, Aggarwal R. E-health and its impact on Indian health care: an analysis. *Paradigm* 2019;23(2):164–174.
15. Sachdev HS, Gera T, Nestel P. Effect of iron supplementation on mental and motor development in children: systematic review of randomised controlled trials. *Public Health Nutr* 2005;8(2):117–132.
16. Kapil U, Bhavna A. Adverse consequences of poor adherence to anaemia control programs in India. *Indian J Community Health* 2019;31(4):532–535.
17. Chaves PH, Ashar B, Guralnik JM, et al. Looking at the relationship between haemoglobin concentration and prevalent mobility difficulty in older women. *J Am Geriatr Soc* 2004;52(7):1252–1258.
18. Balarajan Y, Ramakrishnan U, Özaltin E, et al. Anaemia in low-income and middle-income countries. *Lancet* 2011;378(9809):2123–2135.
19. Bentley ME, Griffiths PL. The burden of anaemia among women in India. *Eur J Clin Nutr* 2003;57(1):52–60.
20. Pande A, Sehgal M, Gupta P, et al. Weekly iron and folic acid supplementation in adolescent girls—an effective intervention in Uttar Pradesh, India. *J Family Med Prim Care* 2023;12(1):128–134.
21. Avula R, Oddo VM, Kadiyala S, et al. Scaling-up community-based programs to improve maternal and child nutrition in India: the case of Alive & Thrive. *Food Nutr Bull* 2020;41(2\_Suppl.):S137–S154.
22. Kaur S, Deshmukh PR, Garg BS. Epidemiological correlates of nutritional anaemia in adolescent girls of rural Wardha. *Indian J Community Med* 2006;31(4):255–258.