

Original Research Article

# Integrated Management of Neonatal and Childhood Illnesses (IMNCI) Training Enhanced Child-Survival Knowledge of Anganwadi Workers in Odisha, India

Meena Som<sup>1</sup>, Krushna Chandra Sahoo<sup>2</sup>, Rojalin Swain<sup>2</sup>, Ashirbad Pradhan<sup>2</sup>, Sandeep Kumar Panigrahi<sup>1</sup>, Pinaki Panigrahi<sup>3</sup>, Ambarish Dutta<sup>2,4</sup>

<sup>1</sup>UNICEF, Odisha, India

<sup>2</sup>Asian Institute of Public Health, Bhubaneswar, India

<sup>3</sup>Center for Global Health and Development, College of Public Health, University of Nebraska Medical Center, Nebraska, United States of America

<sup>4</sup>Indian Institute of Public Health, Bhubaneswar, India

Corresponding Author: Ambarish Dutta

## ABSTRACT

Integrated management of neonatal and childhood illness (IMNCI), a universally acclaimed community-based child-survival programme was rolled out in Odisha during 2006 and the Anganwadi workers (AWWs) were trained to be the frontline implementers. It was perceived that IMNCI has developed operational weakness that led to the decision of discontinuing its implementation through AWWs, hence, withdrawing state support from their training. Alternatively, Accredited Social Health Activists (ASHA), the village-based health volunteers, was to be engaged through a re-packaged programme – Home-based Newborn Care (HBNC). But, neither HBNC has provision for children beyond 42 days, nor the relatively less-educated ASHAs are trained as intensely. This study aims to assess the influence of IMNCI training on the AWW's knowledge regarding childhood illnesses. A cross-sectional study was conducted in 10 districts of Odisha that recruited a probability sample of AWWs (n=443) among both trained and untrained AWWs. During interviews, the AWWs were asked of various aspects of IMNCI-related knowledge. The trained AWWs, as compared to untrained, possessed substantially more IMNCI knowledge. Knowledge of possible serious bacterial infection and nutrition in children aged 0-2 months was almost twice and 1.2 times higher about diarrhoea respectively among trained (p<0.0001). Knowledge for age-group of 2-59 months had modest association with training. IMNCI training is associated with significantly higher knowledge levels among the AWWs, despite operational lacunae in IMNCI. This may provide evidence for the Odisha policy-makers to continue the training of AWWs and continuation of IMNCI implementation, to complement ASHA-led HBNC.

**Key Words:** IMNCI training, Anganwadi Worker, child survival

## INTRODUCTION

Integrated Management of Childhood Illness (IMCI) is a globally proven, primarily community-based strategy to improve child survival and is being implemented worldwide in countries with high burden of child mortality. [1-3] In India,

the highest contributor to child deaths in the world for a considerable period of time, due to its relatively high child mortality rates and being the second most populous country in the world, IMCI was considered as a potential cost effective “game-changer”, as it centered around an integrated mitigation

strategy for commonly occurring childhood illnesses that kill and cause suffering to innumerable children in the world as well as the country. [4] A neonatal component was included in the Indian version of the strategy and it was renamed as Integrated Management of Neonatal and Childhood Illness (IMNCI), focusing equally on the early newborn as the older children, because the neonates continue to contribute to more than 50% of the under-five mortality in the country. IMNCI was piloted in India under the aegis of the national Reproductive and Child Health (RCH) - phase I programme between May 2003 to 2005 and was adopted as a key community-based child survival strategy under RCH - phase II. The RCH - phase II was integrated into the National Rural Health Mission (NRHM), which was launched in 2005 to reinforce the Indian public health system, especially in the rural areas.

Odisha being a state with one of the highest child mortality rates in India – under-five mortality rate is 66 per 1000 live births, [5] which requires successful implementation of evidence-based child survival interventions, to reduce the high child mortality, especially in the 20 high priority districts, where a substantial proportion of their populations face considerable vulnerability; [6,7] hence, the critical importance of IMNCI in the state. In Odisha IMNCI was successfully piloted in Mayurbhanj in 2004-2005 and Koraput in 2006-2007 with support from UNICEF and subsequently expanded to 18 more districts. As per the joint decision of state governmental Department of Health and Family Welfare (DH&FW) and Department of Women and Child Development (DWCD), the Anganwadi workers (AWW - village level workers under DWCD, staffing the Anganwadi centres, which are learning and nutritional support centres for pre-school children) with the support from the Auxiliary Nurse Midwife (ANMs) who staff the sub-centres, the most peripheral service delivery facility of the public health system of India, under the DHFW were earmarked

to be the principal implementers of IMNCI in the state. The NHM supported the IMNCI training of AWWs and ANMs; the training schedule spanning over eight days, with intense hands-on sessions of case management, hence, conducted mostly at district-level hospitals. The IMNCI training of AWWs was rolled-out in Odisha in a phased manner, given the large number of AWWs to be trained for comprehensive population coverage by the programme in the 20 IMNCI-implementing districts, relative inadequacy of trainers and training facilities and the specialized nature of the IMNCI training curriculum.

Initial assessment studies of IMNCI from various parts of the country had identified several weaknesses and lacunae in the implementation of the programme that included lack of routine supportive supervision and monitoring of the ground-level implementers, irregular supply of drugs and consumables and inaccurate reporting, etc. [8-13] These mainly input and process deficiencies might have led to the conclusion by the policymakers that IMNCI was dysfunctional and hence, was not an effective child survival strategy in the current environment, albeit the impact of the strategy was hardly studied using scientific rigour.

Consequently, this led to search for alternative strategies. The health policymakers saw an alternative opportunity in the Accredited Social Health Activists, more popularly known as the ASHAs, the village-level health activist who also functions as an incentivized social mobilizer-cum incentivized home-based service delivery personnel for some public health programmes, and is operating directly under the DH&FW, unlike the AWWs, who are under the DWCD. It was envisaged that ASHAs would be the new implementers of child survival programme designated as Home-based Newborn Care (HBNC). [14] Hence, along with other national health programmes, ASHAs across the country started getting trained in HBNC. It was felt in some quarters of policymaking that

ASHAs would be adequately capable of providing HBNC, which would suffice as the community-based child survival programme hence, there was no need for funding further IMNCI training of AWWs; the same section of the planners also doubting in the first place the capability of the AWWs in terms of their knowledge in carrying-out a specialized community-based health programme like IMNCI, as the AWWs belong to the DWCD and primarily do not function as health workers. As a result, in 2011, the Ministry of Health and Family Welfare, Govt. of India took a policy decision that with effect from April 2012, IMNCI trainings for AWWs would not be further funded by the NHM, though the state could take an independent decision for continuing the training of AWWs and implementation of IMNCI through them, using other funding sources.

Although the ASHAs are being trained to manage childhood illnesses up to the age of 5 years, this incentive-funded cadre has been incentivized to carry out six routine home visits and subsequent assessment of newborn children, within the first 42 days of their lives, at stipulated intervals, under the auspices of HBNC. The HBNC information system only covers the first four weeks of the child's life, the neonatal period, during which a large proportion of infant fatalities occur. But, evidence suggests that the first few weeks do not comprise the only critical period in a child's life with regards to suffering and survival from childhood illnesses; the vulnerability though gradually declining with age remains substantial up to the first 5 years of life. [15] Unfortunately the ASHA-delivered HBNC is not geared to focus on children in the age group of 42 days to 5 years as opposed to IMNCI which equally concentrated on two distinct age-groups – 0 to 60 days and 60 days to 5 years. [14] The counter-argument to the policy decision of defunding the IMNCI training of the AWWs and gradually phasing out the AWW-driven programme is that it is fraught with the danger of losing the child-survival gains

made in the past few years through IMNCI despite the insufficiencies identified in its implementation, and this decision may also lead to dilution of the strategic inputs for child survival beyond 42 days of age, as has been pointed-out earlier.

But, the proponents of the AWW-driven IMNCI model were confronted with a key question whether the AWWs, who are not primarily health-workers, have been able to acquire enhanced knowledge after their IMNCI training, so that, they can assess, provide initial treatment and refer children, who are sick, appropriately. Hence, a knowledge assessment analysis, as a part of the larger state-wide IMNCI assessment exercise, was undertaken to evaluate the child-sickness-related knowledge enhancement of the AWWs, if any, as a result of the IMNCI training they had undergone, as compared to their untrained counterparts, so that policy can be informed.

## **METHODS**

### *Study design and sampling frame*

A cross-sectional assessment study of the statewide IMNCI programme was conducted. Hence, the study design, sampling strategy and the sample size of the AWWs that was used for our knowledge-assessment sub-study, which was envisaged post-hoc during the assessment of the IMNCI programme, was aligned to that larger exercise and the sample limitations, if any, may be viewed in that light.

A multi-stage stratified random sampling strategy was followed to draw the sample. Twenty implementing districts constituted the universe of IMNCI-implementing districts in Odisha. The 20 implementing districts were divided into three strata based on their training and implementation status – early phase ( $n=6$ ), expansion phase ( $n=10$ ) and consolidation phase ( $n=4$ ). Of the twenty districts, three – Cuttack, Jajpur and Ganjam were excluded from the sampling frame as they were at a very early stage of implementation and training of staff, as their inclusion might

have underpowered the study. A total of 6 (35%) districts – one from consolidation phase (Sonepur), four from expansion phase (Rayagada, Malkangiri, Balasore and Boudh) and one from early phase (Kalahandi) were selected randomly from 17 districts divided into these three strata, with slight oversampling from the districts belonging to the expansion phase (64% of expansion phase districts in the sample compared to 50% in the universe). In the second stage of sampling, the constituent blocks of the sampled districts were stratified into two groups “mostly-implementing” and “early-implementing” on the basis of whether 50% front-line workers were trained or not and whether subsequently IMNCI case-assessment and reporting forms were supplied or not to all the staff after the training. This stratification was done for the assessment purpose only. One mostly-implementing block from each sampled district was selected randomly with one additional mostly-implementing block randomly sampled from both Balasore and Kalahandi districts to represent their proportionate contribution to the universe of implementing blocks; consequently eight mostly-implementing blocks were sampled. Similarly eight early-implementing blocks were sampled: one from Sonepur; one each from Rayagada, Malkangiri and Boudh; four from Balasore; and none from Kalahandi. This is because the three expansion-phase districts of Rayagada, Malkangiri and Boudh at the time of assessment had only one block each fitting to the description of early-implementing block; hence oversampling of early-implementing block from Balasore among expansion phase districts which amounted to the remaining four. Kalahandi being the only consolidation phase district in our sample did not have any early-implementing block. In the third stage of sampling 3-4 sub-centres from each of the selected 16 blocks were randomly sampled in keeping with the proportional contribution of each block to the universe of sub-centres from the selected blocks. This led to selection of 30 sub-centres from 8

mostly-implementing blocks and another 30 sub-centres from 8 early-implementing blocks.

In the fourth stage of sampling, from each selected sub-centre 6 to 7 AWWs were randomly sampled, regardless of their IMNCI training status, and interviewed.

#### *Metrics used to assess training*

In line with the training protocols, the knowledge levels of the AWWs were measured regarding managing the illnesses among the two categories of children: 0 to 2 months and 2 months to 59 months, which are the key focal points of IMNCI. For both the age-groups, the knowledge levels were measured under four themes: possible serious bacterial infections (PSBI), diarrhoea, feeding and immunization. Composite scores (0 to 4) were generated depending on the key questions for the respective themes. Questions were also enquired regarding when the training was imparted.

#### *Statistical analysis*

The IMNCI training status of the AWWs (trained: Yes/No) was the principal explanatory variable and their knowledge related to childhood illnesses covered by IMNCI was the main outcome studied. The association between training and knowledge level was estimated using the difference between summary statistics such as medians, proportions and testing statistical significance of the estimate using non-parametric and or chi square (or fishers) tests as applicable. The level of significance testing was set at 5% and analysis was conducted using R package.

#### *Ethical consideration*

The authors obtained ethical approval from their institute. Approval obtained from the Department of Health and Family Welfare and Department of Women and Child Development, Government of Odisha. The participants were informed about the objective of the study and also they could withdraw from the study anytime. The written consents were taken from all participants.

## RESULTS

A total 381 AWWs participated in this study – among them 306 were trained in IMNCI. The district-wise break-up of the interviewed AWWs and their training status is described in Table 1. Approximately 70% of the AWWs were trained two years before their knowledge was assessed by the current exercise.

Table 1: District-wise break-up of the interviewed workers

Districts	AWWs (N = 381)	
	Untrained (N=75) n(%)	Trained (N=306) n(%)
Baleshwar	20 (17)	101 (83)
Boudh	3 (6)	46 (94)
Kalahandi	8 (14)	50 (86)
Malkangiri	7 (14)	45 (86)
Rayagada	11 (21)	42 (79)
Sonepur	26 (54)	22 (46)

PSBI knowledge (0-2 month old) score of AWWs Trained vs Untrained

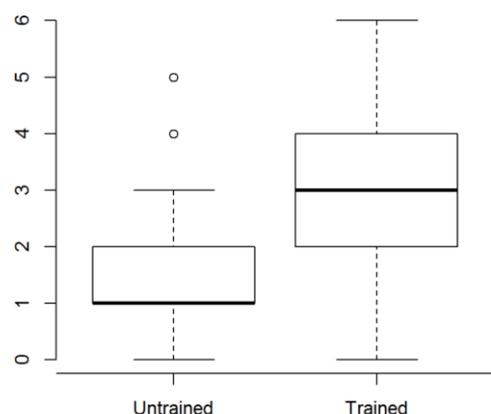


Figure 1: Knowledge level of untrained and trained workers on possible serious bacterial infections

### Knowledge on management of 0-2 months' children

There was a significant difference between the knowledge levels of the trained and untrained workers in case of possible serious bacterial infections (PSBI). The

difference between mean score in the two groups was 1.41 (95% CI, 1.07 – 1.73,  $p < 0.0001$ ). Figure 1 shows the knowledge of untrained and trained workers on possible serious bacterial infections. When differences in further details were explored, the trained group were seven times more likely to be able to identify fast breathing correctly, one and a half times more likely to have knowledge on correct treatment of PSBI.

When stratified by districts, there was a significant difference in the PSBI knowledge score between trained and untrained AWWs in the districts of Balasore, Kalahandi, Rayagada and Sonepur (Table 2).

Table 2: District wise knowledge of PSBI among the AWWs

District	PSBI Knowledge Score	CI	p value
Balasore	1.50	(0.96 – 2.44)	$P < 0.0001$
Kalahandi	1.56	(0.56 – 2.56)	$P < 0.003$
Rayagada	1.64	(0.92 – 2.36)	$P < 0.0001$
Sonepur	1.37	(0.81 – 1.93)	$P < 0.0001$

The score on knowledge of trained and untrained AWWs on nutrition, diarrhoea management and immunization among 0-2 months children is presented in Table 3. The results showed that 70% of trained workers had better knowledge (score > 2) about nutrition as compared to 33% in the untrained category ( $p < 0.0001$ ). It was also found that in case of diarrhoea management, 67% of trained workers had complete knowledge as compared to 52% in the untrained category ( $p < 0.02$ ). In case of immunization 67% of trained workers had better knowledge (score > 1) about immunization as compared to 47% in the untrained category ( $p < 0.0001$ ).

Table 3: Score on knowledge of trained and untrained AWWs on nutrition, diarrhoea management and immunization among 0-2 months children

Score	Nutrition		Diarrhoea management		Immunization	
	Untrained (N=75) n(%)	Trained (N=306) n(%)	Untrained (N=75) n(%)	Trained (N=306) n(%)	Untrained (N=75) n(%)	Trained (N=306) n(%)
0	1 (1)	1 (0.3)	1 (1.3)	0 (0)	24 (32)	33 (11)
1	11 (15)	20 (6)	6 (8)	18 (6)	15 (20)	67 (22)
2	38 (51)	76 (25)	29 (39)	83 (27)	19 (25)	124 (41)
3	24 (32)	103 (34)	39 (52)	205 (67)	17 (23)	82 (27)
4	1 (1)	106 (35)				

### *Knowledge levels on management of 2 – 59 months sick children*

There was no significant association between training and knowledge levels with regard to PSBI ( $p=0.361$ ) for this age-group of children. However there was a strong association between training and knowledge about diarrhoea management as 39% untrained workers do not possess appropriate knowledge in this domain in comparison to 13% among trained staff ( $p<0.0001$ ). A modest association was observed in the domain of appropriate feeding practices of older children with 39% trained AWWs having complete knowledge in comparison to 25% in untrained ( $p=0.03$ ). A modest association was also found between training and immunization. About 38% of the untrained AWWs had complete knowledge as compared to 52% of the trained AWWs ( $p=0.09$ ).

## **DISCUSSION**

We had set out to find the enhancement of the childhood illness-related knowledge of the IMNCI-trained Anganwadi Workers (AWW) in the IMNCI implementing districts of Odisha. The trained AWWs had substantial higher knowledge levels regarding childhood illnesses' management as compared to their untrained counterparts. The enhanced knowledge level was more apparent in the domain of young infants (0–2 months) as compared to the children belonging to 2 months to 59 months age-group.

In the young infant category the gain in the knowledge was most apparent in the PSBI domain, followed by nutrition, diarrhoea and immunization. The higher knowledge levels with regard to PSBI could be due to the fact that illness in newborn is a new area of training for the AWWs. Illness among newborn babies is difficult to diagnose, hence teaching the workers “what danger signs to look for” is very crucial for the strategy to succeed. IMNCI training includes rigorous bedside sessions on demonstration of key danger signs among newborns admitted in specialty health

facilities, as many such danger signs are not frequently encountered in community-based training settings. The trainees are individually encouraged to be well versed and to be able to identify all the major danger signs, as the success of the strategy hinges on their early and appropriate identification at the community-level by the frontline health workers, AWWs in this case. Probably this was reflected in the difference of knowledge regarding PSBI of 0-2 months old children between trained and untrained AWWs.

Again moving on to the domain of nutrition which encompasses “feeding problems” in IMNCI, the focus of which is on problem solving with regards to the technique of breastfeeding by the mothers of the newborn, as opposed to what the AWWs learnt regarding breastfeeding during their induction into the DWCD cadre, the emphasis of which was solely on breastfeeding promotion and not on technical details of its successful initiation and conduction. The IMNCI approach includes positioning, attachment, common problems associated with breast feeding and their management and it also underscores the fact that breast feeding doesn't happen automatically and a first time mother needs to be guided and counselled to initiate and maintain breast feeding successfully. This component of the training is imparted through role-plays, highlighting the common queries and anxieties, first time mothers' bring up with regard to breast-feeding. Hence the IMNCI-trained AWWs displayed significant enhancement of their knowledge regarding the details of breastfeeding.

In the domain of diarrhoea, the IMNCI focuses on identifying the different danger signs, signifying different-levels of diarrhoea-induced dehydration and taking appropriate action based on that; and not to forget the importance of continuing breast-feeding during diarrhoeal illnesses. This approach has possibly helped in complete understanding of the topic and the necessary critical actions by the AWWs, which would

really save lives, whereas, the pre-IMNCI approach has been mostly on ORS promotion for managing diarrhoea, which doesn't distinguish life-saving actions depending upon levels of dehydration. Again our analyses illustrated a significantly improved knowledge among IMNCI-trained AWWs regarding the nuances of diarrhoea-induced situations and the appropriate responses necessary or them.

The knowledge gain among trained AWWs in the domain of immunization was seen to a lesser degree. There is a scope of regular interaction between the AWWs and the Auxiliary Nurse and Midwives (ANMs) - the ANMs being primarily responsible for immunization from the health department-side - at monthly intervals during the immunization sessions. Hence, some degree of updating happens at this forum since the AWW helps in mobilizing the children along with ASHA for the village-wise immunization sessions.

These findings assume significance in view of the fact that 56% of the under-five mortality in the state is constituted by the neonatal mortality and Odisha has the highest neonatal mortality rate in the country. [5] As mentioned earlier, the Home-based Newborn Care (HBNC), conceived as a replacement of IMNCI is being implemented by the Accredited Social Health Activists (ASHA). [14] ASHAs were originally conceived as community mobilisers and were incentivized for certain specific tasks, mainly promoting institutional delivery. Gradually, their roles have been broadened and now also include providing HBNC, mainly through routine home visits, and that too restricted to the first 42 days of life of a child, and not beyond that period. Moreover the ASHAs are lesser educated as compared to the AWWs and are relatively new entrants into the social development system at the community-level as compared to the AWWs. Also, since the AWWs provide preschool education and mobilize children for immunization, they are more familiar with the mothers and young children; hence

the confidence levels of the communities in them might be higher as compared to ASHAs, especially when it comes to choosing between the two with regards to the life-threatening illnesses afflicting their children. Moreover, the training methodology of the HBNC is mostly a classroom based model, which includes training module-based sessions for 5 days with only one field visit to the community and no bedside clinical training. It may not be feasible to demonstrate all the critical danger signs of childhood illnesses to the ASHAs such as chest in-drawing, stridor, and seizures among newborn during their brief training-related community visits. Hence, it can be argued that the AWW-driven IMNCI still has far more potential and scope as a comprehensive community-based child-survival programme as compared to ASHA-driven HBNC, provided its operational lacunae are promptly corrected; and this side of the discourse is furthermore strengthened by the display of impressive post-training knowledge enhancement among its principal implementers - AWWs - which our analyses has clearly shown.

With regards to knowledge of illnesses affecting children aged 2 months to 59 months, the impact of training was less discernible as compared to children aged 0-2 months. In this prior group the IMNCI training had more impact on knowledge of diarrhoea as compared to feeding and immunization. There was hardly any impact on the knowledge of PSBI for this age-group. As explained above, the approach towards diarrhoea management under IMNCI has been different from the training imparted earlier to the AWWs regarding this condition, and hence probably the tangible difference knowledge between trained and untrained AWWs. Moreover, under IMNCI, AWWs have been trained in preparation and storage of ORS; use of various home available fluids; and feeding during illnesses. Diarrhoea being a common problem, AWWs was likely to have enough opportunities to practice their acquired

knowledge from training and reinforce them in the process as well. As expected we did not see much of a difference between trained and untrained workers for feeding and immunization, as the AWWs are well trained and conduct these two activities regularly as a part of their routine activity; the immunization in collaboration with ANM as mentioned earlier. Moreover, since 2012, DH&FW has been training all frontline social sector workforce in infant and young child nutrition across the state, to mitigate the burden of malnutrition in Odisha. There was no significant association between IMNCI training and knowledge of PSBI concerning older children. This may be due to the fact that the common illnesses in this age-group are diarrhoea, respiratory infections and malaria (fever), which have more visible signs and symptoms and easy to identify, especially for AWWs who are primarily providing preschool teaching and supplementary nutrition to older children and interacting with their caregivers frequently.

The other important point, which has emerged is that even though most of the AWWs have been trained more than 2 year before the assessment, retention of knowledge is significantly high, though we could not formally test this in our study in absence of immediate post-training knowledge-assessment results. This also indicates that the training delivery was strong, which makes a more compelling case for AWW-driven IMNCI as a key child-survival strategy in the state. Moreover, this was achieved despite many operational weaknesses of the IMNCI programme; lack of supportive supervision being one of the major ones among them, which if done appropriately perhaps could have resulted in an even higher level of IMNCI-related knowledge among trained AWWs. <sup>[16]</sup>

#### *Methodological consideration*

The limitation of the knowledge-assessment of AWWs study, as mentioned earlier, is that it was post-hoc envisaged as a

sub-study of the larger IMNCI programme assessment study, where frontline health workers were cross-sectionally sampled, hence the lopsided presence of the trained AWWs (n=306) as opposed to untrained AWWs (n=75). But, it is unlikely that it has influenced the results of the study. We also did not collect information on the educational status of the AWWs interviewed, and hence did not adjust for it in our study of training-knowledge association; but educational status being parent to training status and hence confounding the association is very unlikely. The strengths of this assessment is a reasonable sample size of AWWs taken from six districts with using a probability representative sampling strategy, with enough statistical power to detect significant differences between the trained and untrained workers.

#### **CONCLUSION**

The main policy implication of our study is that IMNCI-trained AWWs have enhanced knowledge of childhood illnesses and their management as compared to IMNCI-untrained counterparts, signifying the capability of AWW-driven IMNCI to play a critical role in the child survival scenario in Odisha. This study will help to tilt the state health policy in favour of continuing with IMNCI activities and training of its key functionaries – AWWs – under its aegis; and allocating required funds for it, while strengthening the other components of IMNCI such as its consumables, logistics and supportive supervision. Although ASHA-driven HBNC will also simultaneously provide additional vigil for sicknesses in neonates and early infants, IMNCI will supplement it for children of that age and will complement it for older children, who are not covered by HBNC. Moreover, high priority districts in Odisha will benefit from two village-level functionaries having reasonable knowledge of childhood illnesses, given the sparsity of population and widely spread-out villages, especially those housing the most

marginalized sections of the society in those districts. Moreover, detaching the DWCD, the controller of AWWs, from child survival-related programmes, by defunding IMNCI, would seriously hamper the inter-sectoral collaboration with DHFW; the two departments being mandated to work collaboratively to achieve their harmonized goals. IMNCI is the platform for such inter-sectoral cooperation and synergistic convergence of inputs from these two departments, so that resources can be pooled and effects maximized with regards to child survival and development.

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