



JAPAN: MCH Handbook for the early identification of neurodevelopmental disorders



Maternal and Child Health Handbook, Hirosaki city, Japan, 2021

More attention needs to be paid to neurodevelopmental disorders

Autism spectrum disorder (ASD) is one of the neurodevelopmental disorders (NDDs), and prevalence of ASD is reported to be on the rise worldwide, affecting 1–2% of children across the globe. ASD has gained attention not only in research but also in public health due to its global burden. The research found that ASD was the leading cause of disability in children under the age of 5 years and the total burden of ASD, represented by disability-adjusted life years, was greater than that of other childhood-onset mental disorders (e.g., conduct disorder). The increased global recognition of ASD is corroborated by the fact that the World Health Organization identified developmental disorders, including ASD, as one of the priority areas for intervention among child and adolescent disorders.

The role of MCH Handbook for the early identification of NDDs

Increased parental awareness of ASD is one of the important factors contributing to the early identification of ASD. If caregivers know what early signs to look for in the child's development, they may

bring their concerns to providers in a timely fashion. Maternal and Child Health (MCH) Handbook, one of the home-based health record books, has served an educational tool for pregnant parents, increasing their knowledge about antenatal care, delivery with skilled birth attendants, and childhood vaccinations; the effectiveness of the MCH Handbook in these areas was proven in several developing countries in Asia and the Middle East. In Japan, a public health center provides health consultation or conduct health checkups for children and provides health guidance to them where needed based on the Maternal and Child Health Act, and developmental checkups for children at 18 and 36 months to assess their physical, motor, social-emotional-behavioral, and language developments are also provided at the municipalities as statutory health checkups.

Caregivers are instructed to chart their child's developmental milestones at each time point specified in the MCH Handbook by the developmental checkups (e.g., "Does your child walk without support?" at 18 months, "Does your child put two words together?" at 24 months). Despite abundant data in the MCH Handbook on the child's early development in several domains, however, the potential utility of the MCH Handbook for early identification of ASD or NDDs had never been examined.

▼ Table 1. Four developmental domains and MCH Handbook items

Developmental domain	Age range (months)	Number of items included	MCH Handbook items
Communication	12 months or earlier	2	Babble, Understand simple commands
	24 months or earlier	2	Speak meaningful words, Put two words together
	36 months or earlier	1	Know and say his/her own name
Social interaction	12 months or earlier	6	Smile, Respond to voice, Follow parents, Like to play alone, Turn around when whispered by parents, Use gestures
	24 months or earlier	3	Respond name calling, Engage in symbolic play, Imitate adults' behaviors
	36 months or earlier	2	Engage in pretend play, Have friends
Self-help	12 months or earlier	2	Eat solid food, Eat regularly
	24 months or earlier	3	Drink using a cup, Feed self with a spoon, Eat meats and vegetables
	36 months or earlier	3	Dress and undress on his/her own, Brush teeth and wash hands, Chew foods well
Motor	12 months or earlier	8	Hold head up, Roll over, Sit up without support, Reach for toys nearby, Crawl, Pulling oneself up, Pick up objects with fingers, Walk holding on to things for support
	24 months or earlier	2	Walk without support, Run
	36 months or earlier	2	Climb stairs without support, Draw a circle

Examination of caregiver-reported delays through MCH Handbook

Thus, to examine if caregiver-reported delays in attaining developmental milestones were associated with diagnoses of ASD and other NDDs, we analyzed MCH Handbook data collected from caregivers of children who screened positive ($n = 1,019$) for the developmental survey conducted in a total population sample of 5-year-old children in Hirosaki city in Japan between years 2013 and 2018 ($N=5,429$). We obtained consent from 720 caregivers to extract data of their MCH Handbook when their children presented to the university clinic for comprehensive in-person assessment to determine whether they had specific NDDs or not. To ease the interpretation of the study findings and make them meaningful, we carefully reviewed each item pertaining to developmental milestones in the MCH Handbook and assigned them to one of the four developmental domains (motor, speech, social interaction, and self-help, Table 1).



A family filling out an MCH Handbook at home about their child's development

Differences in attainment of developmental milestones among groups

Our study findings indicate that children diagnosed with NDDs were more likely to show delays in all areas of milestones, and that group differences (NDD vs. non-NDD) were evident in motor, speech, and social interaction by 12 months of age and became even more pronounced at later ages. We also identified differences in the attainment of developmental milestones between children with ASD and ones with other NDDs (Figure 1). Accordingly, our findings indicate the utility of data on the MCH Handbook for tracking attainment of early milestones that may predict future ASD and other NDDs. Additionally, we proposed the future implication of the MCH Handbook possibly as a universal screening tool for the early identification of NDDs, which will require further research to elucidate validity of the MCH Handbook data for this purpose in comparison to existing screening tools in a general population sample.

Potential utility of MCH Handbook for early detection of NDDs from a global health perspective

Although our research was conducted in one catchment area in Japan, we believe our study findings can contribute to global health. Given the widespread use of the MCH Handbook across the

world, the potential utility of the MCH Handbook for early identification of NDDs is beneficial in lower- and middle-income countries (LMICs) where access to professionals is often very limited and requires a long waitlist. In these areas, the delayed diagnosis of NDDs is common, resulting in the delayed interventions and subsequent negative impact on the child's developmental trajectories. However, there remains a challenge from global health perspectives: can early recognition and identification of ASD and other NDDs lead to early interventions? If not, does early identification just leave parents of the child with these conditions a sense of helplessness?

Encouragingly, researchers in the field of NDDs have been working hard to develop interventions that can be provided by non-specialist care providers and caregivers in low-resource settings. For example, researchers in China reported the effectiveness of parent-implemented behavioral interventions for toddlers with ASD.

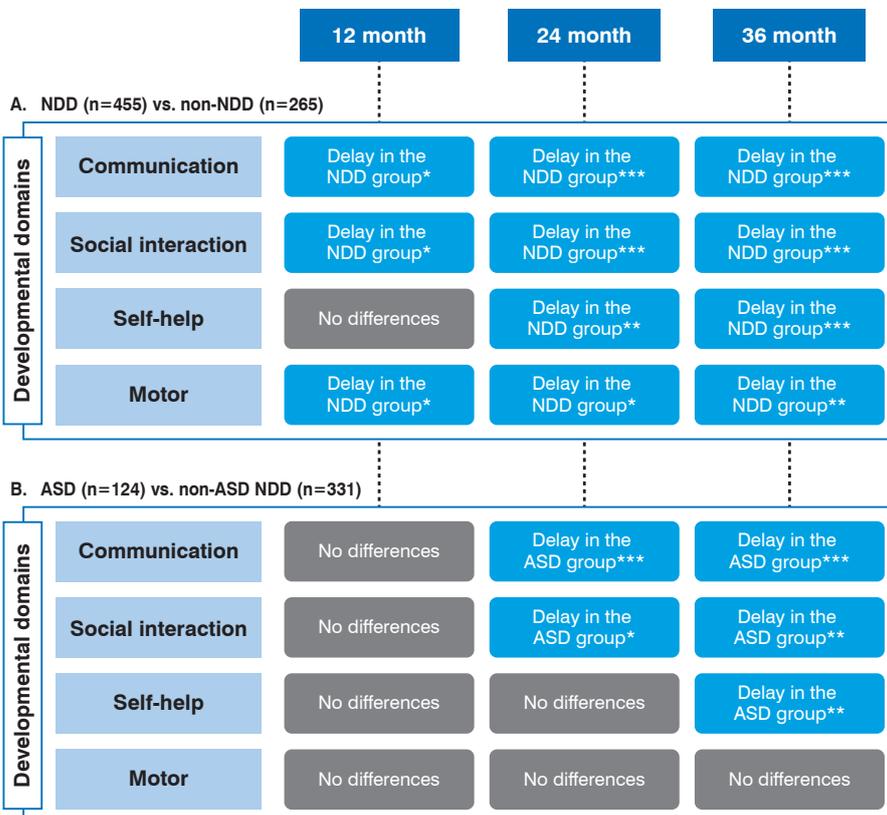
Conclusion

With the recent marked decline in mortality among children in LMICs, there would be an increasing need for the focus on improvements in identification and adequate and timely interventions for children with these NDDs. Although more research is needed especially in LMICs, MCH handbooks can serve as an excellent tool in the early identification of NDDs.

Tomoya Hirota¹, Kazuhiko Nakamura²

¹ Department of Psychiatry and Behavioral Sciences, Weill Institute for Neurosciences, University of California San Francisco, San Francisco

² Department of Neuropsychiatry, Graduate School of Medicine, Hirosaki University, Hirosaki



NDD: neurodevelopmental disorder, ASD: autism spectrum disorder

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (Mann-Whitney U test)

▲ Figure 1. Group comparisons of potential delays in the attainment of developmental milestones by the age of 12, 24, and 36 months

Further readings:

- Baxler AJ, et al. The epidemiology and global burden of autism spectrum disorders. *Psychol Med.* 2015;**45**(3):601-613.
- Hirota T, et al. Utilization of the maternal and child health handbook in early identification of autism spectrum disorder and other neurodevelopmental disorders. *Autism Res.* 2021;**14**(3):551-559.
- Reichow B, et al. Non-specialist psychosocial interventions for children and adolescents with intellectual disability or lower-functioning autism spectrum disorders: a systematic review. *PLoS Med.* 2013;**10**(12):e1001572.