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Improving hepatitis B birth dose coverage through village health volunteer training and pregnant women education

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ABSTRACT

Hepatitis B is highly endemic in the Republic of Kiribati, while the coverage of timely birth dose vaccination, the primary method shown to prevent mother-to-child transmission of hepatitis B virus, was only 66% in 2014. Children born at home are especially at high risk, as they have limited access to timely birth dose (i.e. within 24 h) vaccination. To improve birth dose coverage, a project to improve linkages between village health volunteers and health workers and educate pregnant women on hepatitis B vaccination was carried out in 16 communities with low birth dose coverage in Kiribati from November 2014 to May 2015. After project completion, the coverage of timely birth dose administration increased significantly both in the densely populated capital region of South Tarawa (from 89% to 95%, $p = 0.001$) and the Outer Islands (from 57% to 83%, $p < 0.001$). The coverage of timely birth dose administration among infants born at home increased significantly from 70% to 84% in South Tarawa ($p = 0.001$) and from 49% to 75% in the Outer Islands ($p < 0.001$). Timely birth dose was associated with being born in a hospital, being born during the study period and caregivers having developed an antenatal birth dose plan. The project demonstrates a successful model for improving hepatitis B vaccine birth dose coverage that could be adopted in other areas in Kiribati as well as other similar settings.

1. Background

Chronic hepatitis B infection is the major cause of liver cancer globally. Studies have shown that infants and young children are much more likely to develop chronic infection following exposure to hepatitis B [1]. Known as a "silent killer," hepatitis B may go unnoticed for decades, until the virus causes major liver damage [2]. The Republic of Kiribati is considered to be hyper-endemic for hepatitis B, with the prevalence of hepatitis B surface antigen (HBsAg), a marker for chronic hepatitis B infection, estimated at 15–30% among adults [3,4].

The Republic of Kiribati has a population of approximately 112,000, with approximately 3300 annual births [5]. The population density varies widely, with a higher population density in South Tarawa (where the capital city is located and which accounts for half the population) and very low population density in other two island groups (the Outer Islands). The dispersed population and poor transportation infrastructure among islands creates health services challenges for much of the country.

Since 1995, national hepatitis B birth dose vaccination includes a dose within 24 h of life (also known as timely birth dose), and additional doses at 6, 10 and 14 weeks. In 2014, the national three-dose coverage was 75% and the timely birth dose coverage was 66% [5], indicating that one-third of newborns did not receive a timely birth dose and remained at risk for perinatal infection [6]. Lack of understanding among parents on the importance of hepatitis B birth dose vaccination may be one reason for the low coverage. Additionally,

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approximately 20% of deliveries in Kiribati occur at home [7], which may contribute to low vaccination coverage since the vaccine is not readily available outside of health facilities [8,9].

Studies suggest that hepatitis B vaccine is heat stable and can be stored outside cold chain for up to one month [10,11]. Several studies in countries in the Western Pacific Region found that delivering hepatitis B vaccine outside the cold chain improved birth dose coverage among infants born at homes or in villages where the cold chain was not available [12,13]. The national immunization policy of Kiribati allows for hepatitis B vaccine use outside the cold chain, although such use has not been fully operationalized in the country [14]. With a high percentage of births occurring at home, administering birth dose outside the cold chain for home deliveries is a strategy that would likely improve birth dose coverage, assuring proper monitoring conditions are in place. During the training, nurses were reminded about bringing the vaccine for outreach immunization outside the cold chain.

Community health workers or volunteers hold important primary health care roles [15]. They have in-depth knowledge of fellow members and the culture of their communities. With training and supervision, they have taken on tasks such as health promotion, birth and death registration, and assisting community members in accessing care [16,17]. A systematic review found evidence of moderate to high effectiveness of lay health workers in improving uptake of childhood immunization (risk ratio = 1.22, 95% confidence interval 1.10–1.37) [15].

The primary objective of this project was to assess whether a training package that included educating pregnant women and improving linkages between village health volunteers (VHVs) and health facilities would improve birth dose coverage in areas with low coverage in Kiribati. This project was designed to increase both provision of and demand for the birth dose. Provision was addressed by efforts to improve linkages between communities and health facilities. Demand was addressed by education of community members on the association between hepatitis B and liver disease and the importance of birth dose vaccination to prevent hepatitis B infection.

2. Methods

2.1. Project sites

Sixteen health facilities with birth dose vaccination coverage of less than 70% among infants were selected for the project. The facilities were community health centers providing primary care dispersed throughout Kiribati, with 5 in South Tarawa and 11 in the Outer Islands. None of the health facilities in South Tarawa performed deliveries, whereas all health facilities in the Outer Islands performed deliveries.

2.2. Project interventions

This six-month project was conducted from November 2014 through April 2015. The project included two interventions: (1) educating pregnant women, and (2) enhancing the communications between health workers and VHVs and thus the linkage between health facilities and communities.

Training workshops were held to educate health workers and VHVs on the project and their responsibilities. Health workers included nurses, nurse's aides and medical assistants working in community health facilities. VHVs included health volunteers working in the communities prior to the project, traditional birth attendants and members of village welfare groups. Health workers were instructed to submit monthly implementation reports to the Kiribati Expanded Programme on Immunization (EPI) manager about their meetings with VHVs.

2.2.1. Educating pregnant women

Health workers were instructed to conduct monthly meetings with pregnant women in their communities. The meetings provided education on hepatitis B vaccination and other priority topics related to maternal and child health. Health workers designed these meetings as they wished. VHVs were instructed to conduct monthly household visits to all pregnant women in their communities to register their pregnancies and to encourage antenatal care visits, delivery in health facilities, and birth dose vaccination. Health workers and VHVs educated pregnant women on hepatitis B transmission, the long-term effects of chronic hepatitis B infection and planning for delivery in health facilities and for birth dose vaccination.

2.2.2. Enhancing the linkage between communities and health facilities

Health workers and VHVs were instructed to hold monthly meetings to review education activities in the communities, update pregnancy registers and discuss problems encountered in vaccinating newly born babies. VHVs were instructed to share the lists of pregnant women with community health facilities on a monthly basis. They were also instructed to immediately inform health facility staff of any women who were in labour in their communities. Health workers were instructed to take the vaccine outside the cold chain (e.g. to take the vaccine without using a cold box) to provide outreach vaccination to babies delivered at home.

2.3. Baseline and follow-up surveys

Prior to project implementation, a baseline survey was conducted in October 2014 to measure knowledge and practice among health workers, all VHVs and all caregivers, usually the mothers, of infants born within 12 months before the baseline in the catchment areas of selected health facilities. Health workers were interviewed in the health facilities, while caregivers and VHVs were interviewed in their homes. Six months after implementation of the project, a follow-up survey was conducted among health workers, all VHVs and all caregivers of infants born during the project to assess changes in knowledge and practices and determine project impact.

2.4. Statistical analysis

Immunization coverage was calculated from household interviews with caregivers. Multi-variate two-level logistic regression models were constructed to examine the change of immunization coverage and knowledge of caregivers and factors associated with receiving the birth dose, considering the random effects of health facilities. Statistical analyses were performed using Stata 13 (StataCorp. 2013). A p-value of less than or equal to 0.05 was considered significant. Due to small sample sizes, statistical analyses were not performed on data from the surveys among CHWs and VHVs.

3. Results

3.1. Caregiver surveys

Caregivers were interviewed at baseline (n = 759) and at follow up (n = 394). Table 1 summarizes changes in timely birth dose coverage. Timely birth dose coverage significantly increased overall (from 81% to 93%, $p < 0.001$), in South Tarawa (from 89% to 95%, p = 0.001) and in the Outer Islands (from 57% to 83%, $p < 0.001$).

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