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Measles Incidence and Secular Trend over the Last Five Years, Pre and Post Massive Population Based Vaccination

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Abstract

Measles is a highly contagious infection that affects about 20 million people a year, primarily in the developing areas of Africa and Asia. Vaccination has resulted in a 75% decrease in deaths from measles between 2000 and 2013 with about 85% of children globally being currently vaccinated. The objective is to study measles incidence and trends along the last five years in Dubai, and to study the impact of population based mass immunization intervention on the level of incidence of measles in Dubai. Retrospective records review of the notifiable disease in Dubai (infectious Disease surveillance system) for retrieving secondary data for the year 2013-2014 on measles cases. The output of the mass population Mumps, Measles and Rubella (MMR) vaccination national campaign during 2015 as preventive intervention tool was reviewed. In addition, a cohort of 3-18 years old population was followed for two successive years after mass population immunization campaign. Number of measles cases in the year 2013 was 38 cases among females and 74 cases among males, with a total of 112 cases. Numbers of students who are covered with measles vaccine during the national measles vaccination campaign, 2015, within their school was 162299 students. Number of measles cases has dropped after the campaign to 26 cases in 2016 and 8 cases in 2017. Primary prevention intervention strategy proved to be highly effective in reducing measles incidence and cases towards reaching elimination and eradication status. Vaccination coverage significantly linked to cases reporting and identification among target population. Immunization coverage (routine, catch up and national campaign) needs to be maintained on sustainable performance to accelerate reductions of measles cases reporting on long term. Revising national immunization program performance should be always monitored through the cases reporting and disease incidence.

Keywords

Measles, Incidence, Trends, Pre and Post Intervention

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1. Background

Measles is a highly contagious infection caused by the measles virus. [1, 2] Measles affects about 20 million people a year, [3] primarily in the developing areas of Africa and Asia. [4] No other vaccine-preventable disease causes as many deaths in 1980 2.6 million people died of it; [5] while in 1990 545,000 died, and in 2014 73,000 died from measles. Most of those who are infected and who die are less than five years old. [6] Measles is extremely infectious and its continued circulation in a community depends on the generation of susceptible hosts by birth of children. In communities which generate insufficient new hosts the disease will die out. [7] Analysis of outbreaks in island communities suggested that the CCS for measles is around 250,000. [8] To achieve herd immunity, more than 95% of the community must be vaccinated due to the ease with which measles is transmitted from person to person. [9] As of

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2013, measles remains the leading cause of vaccine-preventable deaths in the world. In developed countries, death occurs in one to two cases out of every 1,000 (0.1% – 0.2%). [10] In populations with high levels of malnutrition and a lack of adequate healthcare, mortality can be as high as 10%. In cases with complications, the rate may rise to 20–30%. [11] In 2012, the number of deaths due to measles was 78% lower than in 2000 due to increased rates of immunization among UN member states.

The measles vaccine is effective at preventing the disease. Vaccination has resulted in a 75% decrease in deaths from measles between 2000 and 2013 with about 85% of children globally being currently vaccinated

Measles vaccination made an important contribution to the millennium development goal to reduce under-5 mortality (MDG4), [12] accounting for 23% of the estimated worldwide decline in all-cause child mortality from 1990 to 2008. A cornerstone of the strategy was that all children be offered a second opportunity to receive a dose of measles-containing vaccine, either through routine immunization services or through mass vaccination campaigns (known as supplementary immunization activities). [13] Supplemental immunization targets all children, to reach those who have been missed by routine services and also those who may have failed to develop an appropriate immune response after vaccination. [14, 15]

Campaign-style delivery has two key advantages over routine services; it can achieve high coverage even in areas where the reach of routine services is weak2 and it reduces access barriers. On the other hand, a weakness of campaign delivery is that it represents a one-time or cyclic event. Some countries have made strategic use of mass vaccination campaigns to offer additional health interventions. [16].

2. Objectives

To study measles incidence and trends along the last five years in Dubai, and to study the impact of population based mass immunization intervention on the level of incidence of measles in Dubai.

3. Methodology

The study has used multiple approaches. Retrospective records review of the notifiable disease in Dubai (Infectious Disease surveillance system) for retrieving secondary data for the year 2013-2014 on measles cases. The output of the mass population Mumps, Measles and Rubella (MMR) vaccination national campaign during 2015 as preventive intervention tool was reviewed. In addition, a cohort of 3-18 years old population was followed for two successive years after mass population immunization campaign.

4. Results

Figure 1 shows number of measles cases in the year 2013. 38 cases were among females and 74 cases were among males with a total of 112 cases.

Figure 2 explains numbers of students who are covered with measles vaccine during the national measles vaccination campaign, 2015. It shows that 162299 students were covered with the vaccine within their school.

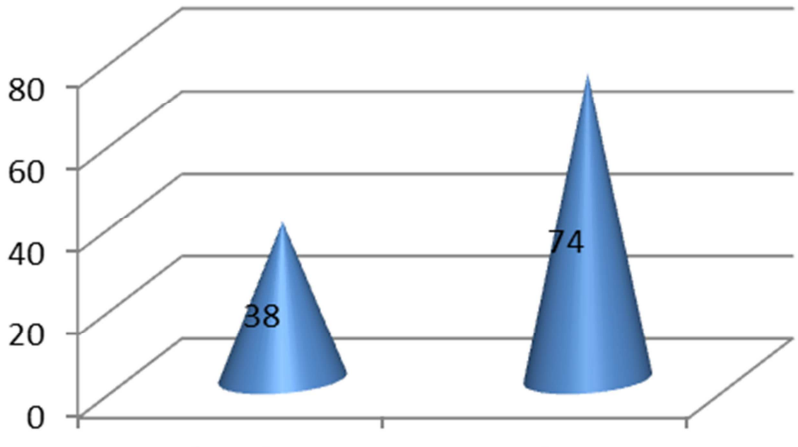

Figure 1. Number of measles cases among females and males in Dubai for the year of 2013.

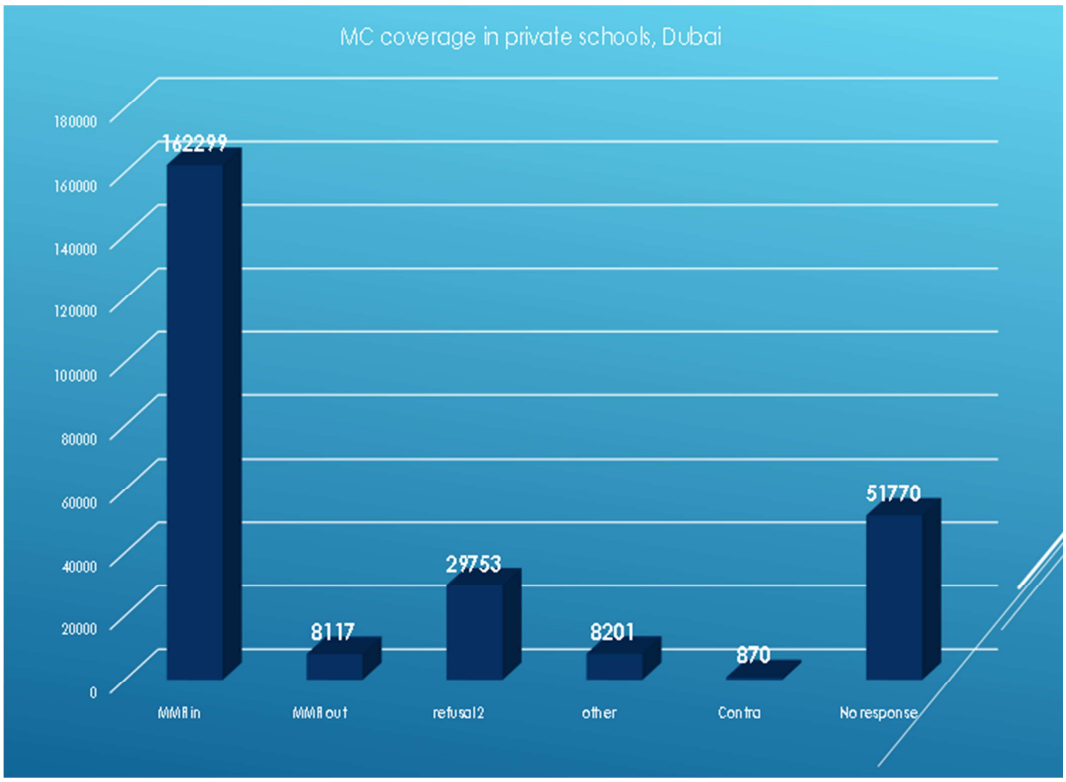

Figure 2. Students coverage during measles campgian for the school age (3-18) years in 2015.

Table 1 shows number of measles cases after the campaign in 2016 and in 2017. The cases has droped to 26 cases in 2016 and 8 cases in 2017.

Table 1. Number of cases of some communicable diseases cases 2015-2016.

Number of measles cases in the year	No.
2016	26
2017	8

Figure 3 shows the trend of rduction.

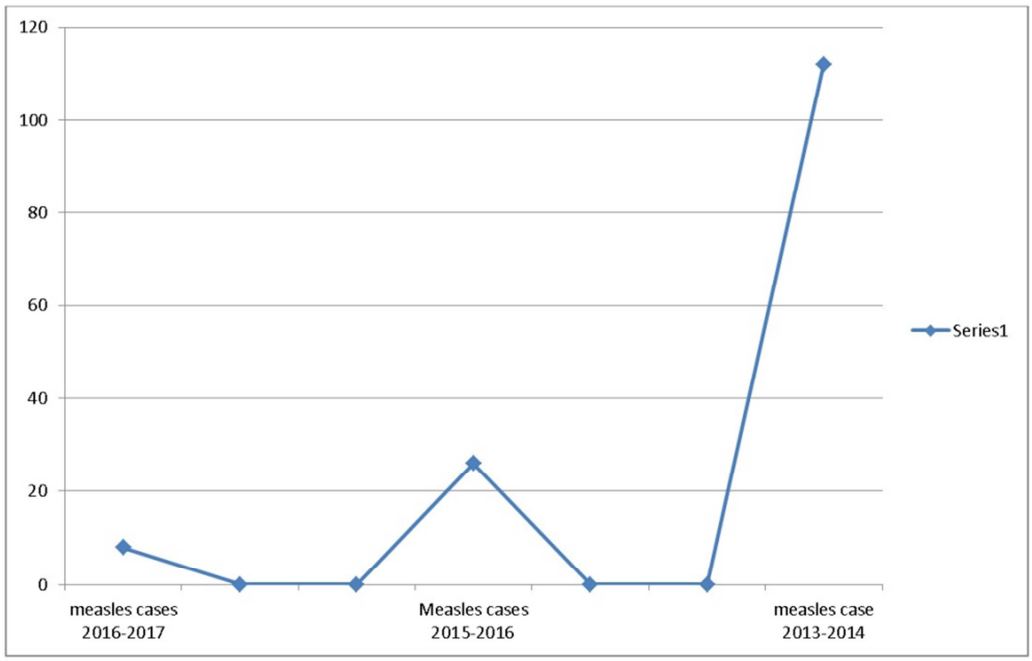

Figure 3. Pre – post intervention Measles cases trend.

5. Discussion

The current study revealed that the incidence of measles has been significantly reduced when comparing between pre and post mass immunization intervention. This finding is shown as similar to the finding detected by another study in India. [17] Which concluded that mass vaccination campaigns are resource-intensive and planners must assess their value among a range of options for health improvement and resource expenditure? The introduction of a second opportunity for measles vaccination through large-scale campaigns from 2010 to 2013 made an important contribution to reducing mortality from measles. model-based analysis of 12 of the 14 participating states found that India's measles supplementary immunization activity likely saved the lives of approximately 19 000 under-5 children, corresponding to roughly 29% (range: 24% to 35%) of India's annual measles mortality. [18]

It is also found that a hypothetical supplementary immunization package delivering measles vaccine and a set of additional interventions of known effectiveness would increase the impact on mortality of the mass measles vaccination campaign more than threefold. This reflects the high burden of infectious disease and under nutrition among Indian children, the impact of malaria in some areas and the relatively low coverage of these key interventions. [19, 20]

Mass measles vaccination campaigns in many countries have offered additional interventions, but the choice of which interventions to include has generally been made in an ad hoc way rather than through a systematic analysis such as the one illustrated here. Two other studies showed statistically significant benefit to immunization (RR 0.14; 95% CI, 0.02 to 0.98. [21] And OR 0.23; 95% CI, 0.11 to 0.50). [22] Three other studies did not find statistically significant results [23-25] Cochrane review published in 2012 assessed the effectiveness and safety of MMR vaccine in children up to 15 years of age, as primary prevention of these childhood diseases. [26] Results suggested that one MMR vaccine dose is 92% effective in preventing secondary measles cases among household contacts. This study provided further evidence of the cost-effectiveness of vaccination in outbreak control, and yielded useful information to inform control strategies in the event of a school-based outbreak. Decisions about which groups of children to aim at and whether to conduct school-based clinics will be influenced by local circumstances, particularly the baseline measles vaccination rate and the measles attack rate among infants.

6. Conclusion

Primary prevention intervention strategy proved to be highly effective in reducing measles incidence and cases towards reaching elimination and eradication status. Vaccination coverage significantly linked to cases reporting and identification among target population. Immunization coverage (routine, catch up and national campaign) needs to be maintained on sustainable performance to accelerate reductions of measles cases reporting on long term. Revising national immunization program performance should be always monitored through the cases reporting and disease incidence.

Conflict of Interest

All the authors do not have any possible conflicts of interest.

References

[1] Caserta, MT, ed. (September 2013). "Measles". Merck Manual Professional. Merck Sharp & Dohme Corp. Archived from the original on 23 March 2014.

[2] Dept. of Health, Saskatchewan. Archived from the original on 10 February 2015. Retrieved 10 February 2015.

[3] WHO. November 2014. Measles Fact sheet N°286Archived from the original on 3 February 2015.

[4] Kabra, SK; Lodhra, R (14 August 2013). "Antibiotics for preventing complications in children with measles". Cochrane Database of Systematic Reviews. 8: CD001477. PMID 23943263. Doi:10.1002/14651858.CD001477.pub4.

[5] GBD 2015 Mortality and Causes of Death, Collaborators. (8 October 2016). "Global, regional, and national life expectancy, all-cause mortality, and cause-specific mortality for 249 causes of death, 1980–2015: a systematic analysis for the Global Burden of Disease Study 2015.". Lancet. 388 (10053): 1459–1544. PMID 27733281. doi:10.1016/S0140-6736(16)31012-1.

[6] GBD 2013 Mortality and Causes of Death, Collaborators (17 December 2014). "Global, regional, and national age-sex specific all-cause and cause-specific mortality for 240 causes of death, 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013.". Lancet. 385: 117–171.

[7] Bartlett, M. S. (1957). "Measles periodicity and community size". J. Roy. Stat. Soc. Ser. A (120): 48–70.

[8] Black FL (1966). "Measles endemicity in insular populations; critical community size and its evolutionary implications". Journal of Theoretical Biology. 11 (2): 207–11. PMID 5965486. doi:10.1016/0022-5193(66)90161-5.

[9] Ludlow M, McQuaid S, Milner D, de Swart RL, Duprex WP (January 2015). "Pathological consequences of systemic measles virus infection". The Journal of pathology. 235 (2): 253–65. PMID 25294240. doi:10.1002/path.4457.

[10] "Complications of measles". CDC. November 3, 2014. Archived from the original on January 3, 2015. Retrieved November 7, 2014.

[11] Measles Archived 2015-02-03 at the Wayback Machine., World Health Organization Fact sheet N°286. Retrieved June 28, 2012. Updated February 2014.

[12] The millennium development goals report 2015. New York: United Nations; 2015.

[13] Progress in global measles control, 2000–2010. Wkly Epidemiol Rec. 2012 Feb 3;85(5):45-52. http://dx.doi.org/10.1093/infdis/jir081 pmid: 21666160

[14] van den Ent MM, Brown DW, Hoekstra EJ, Christie A, Cochi SL. Measles mortality reduction contributes substantially to reduction of all cause mortality among children less than five years of age, 1990–2008. J Infect Dis. 2011 Jul; 204 Suppl 1:S18–23. http://dx.doi.org/10.1093/infdis/jir081pmid: 21666160

[15] Measles vaccines – WHO position paper. Wkly Epidemiol Rec. 2009 Aug 28;84(35):349-60. http://dx.doi.org/10.1016/S0140-6736(05)67216-9 pmid: 16139658

[16] Progress in global measles control, 2000–2010. Wkly Epidemiol Rec. 2012 Feb 3;85(5):45-52. http://dx.doi.org/10.1093/infdis/jir081 pmid: 21666160

[17] District level household and facility survey (DLHS-3), 2007–8: India. Mumbai: International Institute for Population Sciences; 2010.

[18] Barrabeig I, Rovira A, Rius C, Munoz P, Soldevila N, Batalla J, et al. Effectiveness of measles vaccination for control of exposed children. Pediatr Infect Dis. 2011 Jan; 30(1):78–80.

[19] Sutcliffe PA, Rea E. Outbreak of measles in a highly vaccinated secondary school population. CM7. Barrabeig I, Rovira A, Rius C, Munoz P, Soldevila N, Batalla J, et al. Effectiveness of measles vaccination for control of exposed children. Pediatr Infect Dis. 2011 Jan; 30(1):78–80.

[20] Sutcliffe PA, Rea E. Outbreak of measles in a highly vaccinated secondary school population. CMAJ [Internet] 1996 Nov 15;155(10):1407–1413. [cited 2014 Oct 6]; Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1335111.

[21] Yuan L. Measles outbreak in 31 schools: risk factors for vaccine failure and evaluation of a selective revaccination strategy. CMAJ [Internet] 1994 Apr 1;150(7):1093–1098. [cited 2014 Oct 7]; Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1486406.

[22] Sheppard V, Forssmann B, Ferson MJ, Moreira C, Campbell-Lloyd S, Dwyer DE, et al. The effectiveness of prophylaxis for measles contacts in NSW. NSW Public Health Bull [Internet] 2009 May;20(5–6):81–85. [cited 2014 Oct 7]; Available from:http://www.publish.csiro.au/?act=view_file&file_id=NB08014.pdf.

[23] Rice P, Young Y, Cohen B, Ramsay M. MMR immunization after contact with measles virus. Lancet. 2004 Feb 14;363(9408):569–570. 7. Barrabeig I, Rovira A, Rius C, Munoz P, Soldevila N, Batalla J, et al. Effectiveness of measles vaccination for control of exposed children. Pediatr Infect Dis. 2011 Jan;30(1):78–80.

[24] Sutcliffe PA, Rea E. Outbreak of measles in a highly vaccinated secondary school population. CMAJ [Internet] 1996 Nov 15;155(10):1407–1413. [cited 2014 Oct 6]; Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1335111.

[25] Yuan L. Measles outbreak in 31 schools: risk factors for vaccine failure and evaluation of a selective revaccination strategy. CMAJ [Internet] 1994 Apr 1; 150(7):1093–1098. [cited 2014 Oct 7]; Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1486406.

[26] Sheppeard V, Forssman B, Ferson MJ, Moreira C, Campbell-Lloyd S, Dwyer DE, et al. The effectiveness of prophylaxis for measles contacts in NSW. NSW Public Health Bull [Internet] 2009 May; 20(5–6):81–85. [cited 2014 Oct 7]; Available from: http://www.publish.csiro.au/?act=view_file&file_id=NB08014.pdf.