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## Analysis of the Vaccine Financing Indicators

### Introduction

Since 1998, the WHO-UNICEF Joint Reporting Form (JRF) mechanism has been collecting data on two vaccine financing indicators as part of a set of immunization systems indicators designed to measure system performance and trends in Member States. The first indicator reports whether or not a WHO Member State has a line item in its national budget for the purchasing of vaccines used in routine immunization. The second measures the percentage of all expenditures on routine vaccines which were financed by the government using internal public funds<sup>1</sup>. This latter indicator quantifies the relative share of government financing for immunization, as compared to other sources of vaccine financing - including from international donors.

While these two indicators have been collected since 1998, the data have been under-utilized to date<sup>2</sup>. Thus, a first objective of this analysis is to compile and present these vaccine financing indicators in a meaningful way, and determine whether they generate useful strategic information that merits being monitored in the future. While no attempt will be made to evaluate the quality of the data, analysing the information reported by countries is a first step in improving our understanding of it. A second objective of this analysis is to explore whether these indicators can answer a long-standing policy question about vaccine financing, in particular focusing on whether the existence of a vaccine line item in the national budget is associated with an increase in governmental budget allocations for funding vaccines used for routine immunization.

Before presenting the findings from the analysis, it may be useful to describe the rationale behind having a line item in the national budget for vaccine purchasing, and also how the existence of such a line item have been a requirement to participate in three international mechanisms to fund vaccines.

### Rationale for a National Budget Line for Vaccine Purchasing

The rationale for creating a national budget line for vaccine purchasing is based on the assumption that the line item can contribute to improved financing, or is indicative of an intention to finance vaccines, using government funds. In particular, a national budget line for vaccines is thought to:

1. Increase awareness of the need to allocate funds to a priority health service. It is thought that the presence of a line item for vaccines - with the greater awareness it creates - will inspire national governments to increase their budgetary efforts in respect of this priority health programme. The government officials responsible for budgetary decisions will be more conscious of the importance of immunization and the need for vaccine procurement if it is visible in the national budget.
2. Signal long-term political commitment to immunization. It is assumed that governments that choose to introduce an immunization-related line item into the national budget will have a strong commitment to the programme if they are willing to make these budget allocations visible.
3. Permit tracking of allocations and expenditures. The creation of a line item for vaccine purchases is thought to increase transparency in the allocation of funds, and can allow external agencies to better monitor the government's budgetary effort.

### International Mechanisms to Facilitate Vaccine Financing

A major feature of several international mechanisms to facilitate vaccine financing is the requirement that participating countries must establish a national budget line for vaccines, and commit over time to raising the proportion of vaccine expenditures that are paid through the national budget. The inclusion of a line item in the annual budget is intended to encourage long-term sustainability and transfer the responsibility of vaccine financing to government budgets.

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<sup>1</sup> This source of financing refers to domestic public funding for immunization derived from taxation or other sources of public revenues at the central and/or sub-national levels, and allocated through a formal budgetary process. It can include the non-concessionary portion of a development loan, national budget support and debt relief proceeds.

<sup>2</sup> In 2001, two additional financing indicators related to injection supplies were included in the WHO-UNICEF Joint Reporting Form: namely whether or not a WHO member country had a line item in the national budget for purchase of injection supplies for routine immunizations (syringes, needles, safety boxes), and what percentage of recurrent programme-specific routine immunization spending was financed using government funds. These two indicators were not analysed in this report.



This has been the case for three international mechanisms that have been developed to assist countries in increasing their financial contribution for vaccines. The oldest is the PAHO Revolving Fund (RF) which began in 1979 as the first mechanism established to assist countries in becoming more self-sufficient in the purchasing of their vaccines for routine immunization. The fund operates on the concept of a pooled common revolving fund which is able to secure low vaccine prices through large volume contracts with manufacturers<sup>3</sup>.

Based on the success of the PAHO model, UNICEF established the Vaccine Independence Initiative (VII) in 1991. The impetus for setting up this programme was the realization that UNICEF and donor financing could not cover the ever-increasing demand for routine vaccines. An objective of the initiative when it began was to increase the self-reliance of countries with respect to the financing of their immunization programmes. This would have the potential to free up government, as well as donor, funding to pay for the introduction of new vaccines. By helping to facilitate sustainable financing of the traditional vaccines, countries would be more willing to add new ones to the vaccination schedule<sup>4</sup>. The basic features of the VII are similar to those of the PAHO Revolving Fund. These include dollar-based funds which serve as lines of credit for governments that are unable to make advance payments for vaccines.

Since 1997, the ARIVA Initiative (*Appui au Renforcement de l'Indépendance Vaccinale en Afrique*) has earmarked European Union structural adjustment funding for immunization in order to strengthen and facilitate the financial sustainability of immunization in West African countries<sup>5</sup>. Most ARIVA countries utilize the UNICEF VII for short-term credit and access to foreign exchange, and all use the UNICEF Supply Division for the actual procurement of vaccines.

## Data Reporting & Methodology

Over the years, the reporting by countries of these two JRF financing indicators has been irregular. Yet, the proportion of countries reporting information has increased significantly over time. By 2004, levels of reporting completeness reached 83% for the line item indicator, and 73% for the indicator measuring the percentage of routine vaccine expenditures financed by national governments.

Table 1 - Proportion of countries by region reporting on the vaccine financing indicators<sup>6</sup>

	Line item in the national budget for the purchasing of vaccines		Percentage of routine vaccine expenditures financed by the government	
	1998	2004	1998	2004
AFR (46)	67% (31)	100% (46)	54% (25)	87% (40)
AMR (35) <sup>7</sup>	N/A	74% (26)	N/A	86% (30)
EMR (22)	86% (19)	95% (21)	82% (18)	86% (19)
EUR (51)	57% (29)	90% (46)	57% (29)	73% (37)
SEAR (11)	91% (10)	100% (11)	82% (9)	82% (9)
WPR (27)	74% (20)	59% (16)	67% (18)	52% (14)
<b>Overall (192)</b>	<b>57% (109)<sup>5</sup></b>	<b>86% (166)</b>	<b>52% (100)<sup>5</sup></b>	<b>78% (149)</b>

Given the uneven reporting by some countries, not all 192 WHO Member States could be included in the analysis. To increase the size of the available subset of countries, various methods were used to impute missing values for countries that had reported partial information between 1998 to 2004.

Since the line item indicator had a good level of reporting and is a qualitative "Yes/No" question, it was relatively straightforward to impute missing values and make inferences about trends if, for a given year, a country had not

<sup>3</sup> Maceira D, Schott J. W, Bumbak S, Garcia G, and McGaugh J. *Analysis of Three International Mechanisms Supporting Immunization Programs: The Pan American Health Organization Revolving Fund*. Abt Associates Inc. with funding from the Children's Vaccine Program at PATH. 2001.

<sup>4</sup> Wittenberg T, Makinen M, McGaugh J, and Sakagawa B. *Analysis of Three International Mechanisms Supporting Immunization Programs: The Vaccine Independence Initiative*. Abt Associates Inc with funding from the Children's Vaccine Program at PATH. 2002.

<sup>5</sup> Kaddar M, Makinen M, and Sakagawa B. *Analysis of Three International Mechanisms Supporting Immunization Programs: The European Union's ARIVAS*. Abt Associates Inc with funding from the Children's Vaccine Program at PATH. 2002.

<sup>6</sup> Table 1 presents the original reporting through the WHO-UNICEF Joint Reporting Form and does not include imputed missing values. The regional acronyms are as follows: AFR (Africa Region), AMR (Americas Region), EMR (Eastern Mediterranean Region), EUR (European Region), SEA (South East Asia Region), WPR (West Pacific Region).

<sup>7</sup> The lack of reported information in 1998 is a reflection of the unavailability of the data for AMR through the WHO-UNICEF Joint Reporting Form in that year. A harmonization exercise with the Pan-American Health Organization (PAHO) has taken place since, and the data has been made available for the analysis.



reported the information, but had done so for other years<sup>8</sup>. Imputing missing values on the indicator measuring the percentage of government funding for vaccines was more difficult, given the weaker reporting and the difficulty of making assumptions about trends. A process of cross-checking the dataset against the original WHO-UNICEF Joint Reporting Form, and reviewing the comments that were provided by countries, helped to complete the dataset. Finally, some missing values were imputed in somewhat the same fashion as was done with the line item indicator<sup>9</sup>.

The task of imputing missing values was made easier with better reporting over time and by cross-checking with other sources of information (e.g. : financial sustainability plans) and feedback from regional offices. In total, a subset of 175 WHO Member States (out of 192) was retained for this analysis<sup>10</sup>.

## Analysis

The analysis of the vaccine financing indicators is presented in three parts and the findings are compared across time and WHO regions, and using the classification of countries into World Bank income groups<sup>11</sup>. The first part of the analysis reviews whether countries are including a line item in the national budget to support the purchasing of vaccines for routine immunization. The second describes how national governments have been funding vaccines for routine immunization. The third part explores the relationship between the inclusion of a line item in the national budget and the financial responsibility for vaccine purchasing through government budgets.

### 1. Line Item in National Budget for the Purchasing of Vaccines

Three important findings have emerged from the analysis of the line item indicator. A first finding is that the majority of countries in the sample have introduced a line item in their national budget for the purchasing of vaccines for routine immunization, and that since 1998 the number of countries with a vaccine line item has been steadily increasing. By 2004, over 91% of countries had a vaccine line item in their national budget - up from 79% in 1998.

Table 2 - Regional trend in countries reporting line item in national budget for the purchasing of vaccines<sup>12</sup>

	1998	1999	2000	2001	2002	2003	2004
AFR (40)	29 (73%)	31 (78%)	31 (78%)	32 (80%)	32 (80%)	34 (85%)	34 (85%)
AMR (34)	31 (91%)	31 (91%)	31 (91%)	31 (91%)	31 (91%)	31 (91%)	31 (91%)
EMR (21)	17 (81%)	17 (81%)	18 (86%)	18 (86%)	18 (86%)	18 (86%)	18 (86%)
EUR (44)	35 (80%)	35 (80%)	37 (84%)	38 (86%)	38 (86%)	39 (89%)	43 (98%)
SEAR (10)	8 (80%)	8 (80%)	8 (80%)	8 (80%)	8 (80%)	8 (80%)	8 (80%)
WPR (26)	18 (69%)	20 (77%)	22 (85%)	22 (85%)	25 (96%)	25 (96%)	25 (96%)
Total Reporting "Yes"	138 (79%)	142 (81%)	147 (84%)	149 (85%)	152 (87%)	155 (89%)	159 (91%)
Total Reporting "No"	37 (21%)	33 (19%)	28 (16%)	26 (15%)	23 (13%)	20 (11%)	16 (9%)

A second finding is that the trend shows important variations across WHO regions. Whereas in AMR, EMR and SEAR there has been very little change between 1998 and 2004, the trend in AFR, EUR and WPR has been marked by positive growth in the number of countries with vaccine line items in the national budget. In WPR, the proportion of countries in the region with vaccine line items rose from 69% in 1998 to 96% by 2004. In AFR the proportion of countries went from 73% to 85% during the same period.

<sup>8</sup> For instance, if a country reported "Yes" in 2000 and in 2002, but there was no reporting in 2001, the missing value was entered as "Yes". An important supposition made is that once a country makes the transition from not having a line item in the national budget for the purchasing of vaccines (reporting "no") to having one (reporting "yes"), it was assumed that the country would continue to have this budget line in subsequent years. Thus if the last reported answer for a country was "yes", the missing values for subsequent years would be imputed as "yes".

<sup>9</sup> For instance, if a country reported 100% or 0% for the majority of the years, the missing years were entered as 100% or 0%.

<sup>10</sup> The 17 countries excluded are: Bahamas, Belgium, Democratic People's Republic of Korea, Djibouti, Equatorial Guinea, Ethiopia, France, Gabon, Ghana, Greece, Luxembourg, Monaco, Niger, Palau, Sweden, Switzerland, and Togo.

<sup>11</sup> The World Bank income group classification of countries distinguishes countries between low, lower-middle, upper-middle and high income. Low and lower-middle income are defined as countries that have a per capita GNI of less than \$765, or between \$766 - \$3'035 respectively. Upper-middle and high income are defined as countries that have a per capita GNI of between \$3'036 - \$9'385, and above \$9'385 respectively.

<sup>12</sup> The numbers in the table represent the number of countries that answered "Yes" to the question whether they have a line item in the national budget for the purchasing of vaccines used in routine immunization. The percentage values in brackets refer to the proportion of countries within the region that have a line item in the national budget for the purchasing of vaccines used in routine immunization.

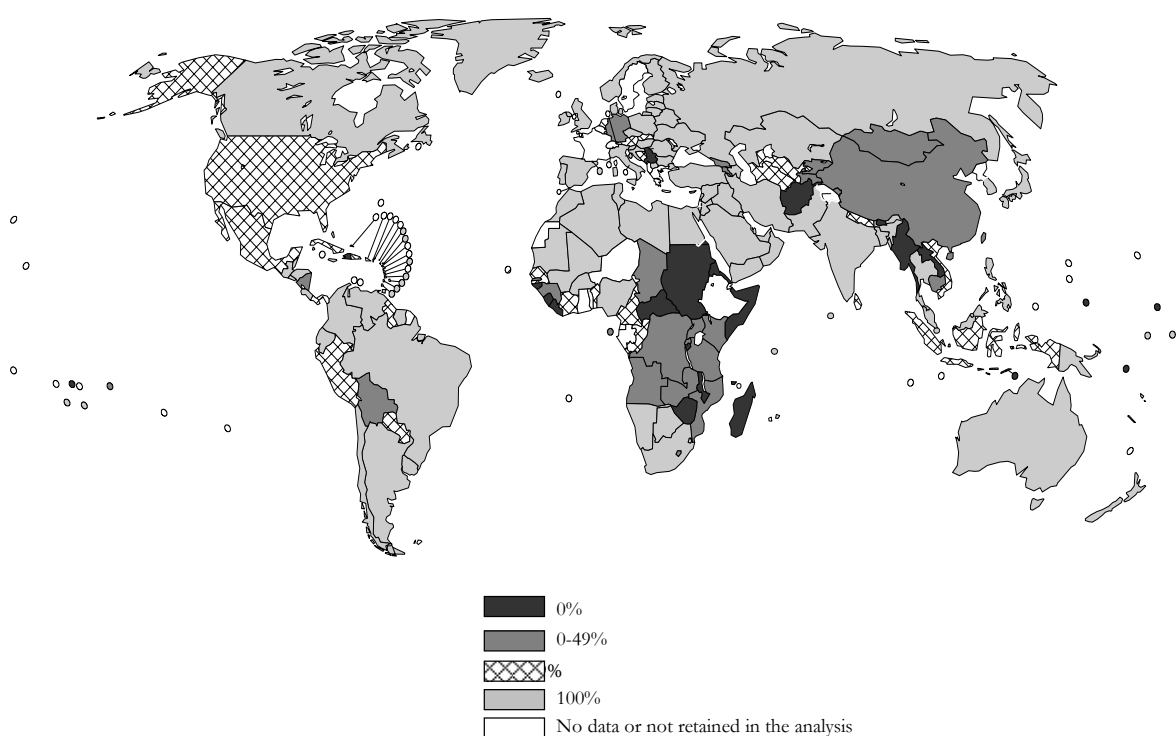


The third finding is that fewer low income countries have introduced an immunization-related line item into the national budget than middle to high income countries. In 1998, some 60% of low income countries had a line item in the national budget for the purchasing of vaccines, compared to 90% for all other income groups. However, by 2004 the proportion of low income countries with a vaccine line item increased to 78%, compared to 98% for all other income groups.

## 2. Routine Vaccine Expenditures Financed using Government Funds

The analysis of the government funding for vaccines indicator also yields a number of interesting findings. First, more than half of overall routine vaccine expenditures are funded by national governments. Since 1998, the general trend has been one characterized by modest increases, where the relative share of government funding for vaccines has remained in the neighbourhood of 69% to 75% (Table 3).

Figure 1 - Government funding of routine vaccines as reported by WHO Member States - 2004



Furthermore, the analysis showed that the level of government funding for vaccines varies greatly from one region to the next. At one end of the spectrum, government funding for vaccines in AFR has ranged from 44% to 51%. Whereas an upward trend in government funding for vaccines was noted between 1998 and 2000, the average government funding for vaccines in AFR since 2002 has levelled to 45%. The specific reasons for the drop are unclear, and the countries that are driving this trend are: Chad, Côte d'Ivoire, Gambia, Guinea, Kenya, Madagascar, Senegal, Uganda, and Zimbabwe. These countries have seen recent falls in their relative share of government funding for vaccines since 2002.

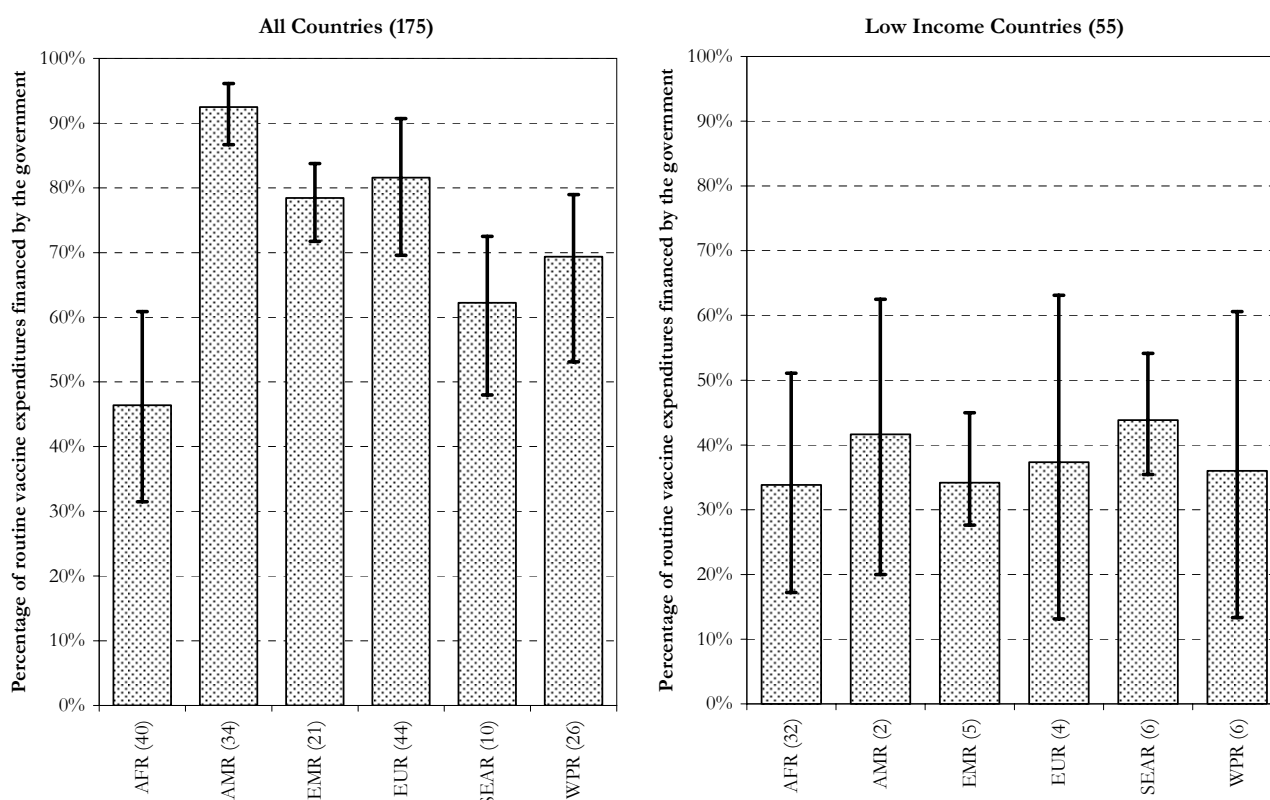


Table 3 - Regional trend in the percentage of routine vaccine expenditures financed by 175 national governments

	1998	1999	2000	2001	2002	2003	2004
AFR (40)	44%	48%	51%	46%	45%	45%	45%
AMR (34)	94%	94%	94%	92%	91%	94%	89%
EMR (21)	73%	77%	77%	79%	79%	83%	83%
EUR (44)	76%	77%	81%	81%	87%	87%	83%
SEAR (10)	58%	60%	63%	66%	61%	65%	62%
WPR (26)	67%	69%	69%	72%	70%	71%	67%
Overall (175)	69%	72%	73%	73%	73%	75%	72%

At the other end of the spectrum, the governments in AMR are almost entirely self-sufficient in their vaccines financing. For the most part, 90% of all routine vaccine expenditures are financed by the government. In recent years, the regional average has declined slightly to reach 89% in 2004, with countries such as Bolivia, Guyana and Nicaragua seeing a drop in the relative share of government funding for vaccines.

Figure 2 - Average government funding of routine vaccines by region - 1998-2004 and annual range



Lastly, the findings show important differences in low income countries as compared to the aggregated analysis (Figure 2). Government funding for vaccines in low income countries is 35% on average. This contrasts with an average of 92% in high income countries. It would appear that all poor countries, irrespective of where they are in the world, are still largely dependant on external support to fund their routine vaccines.

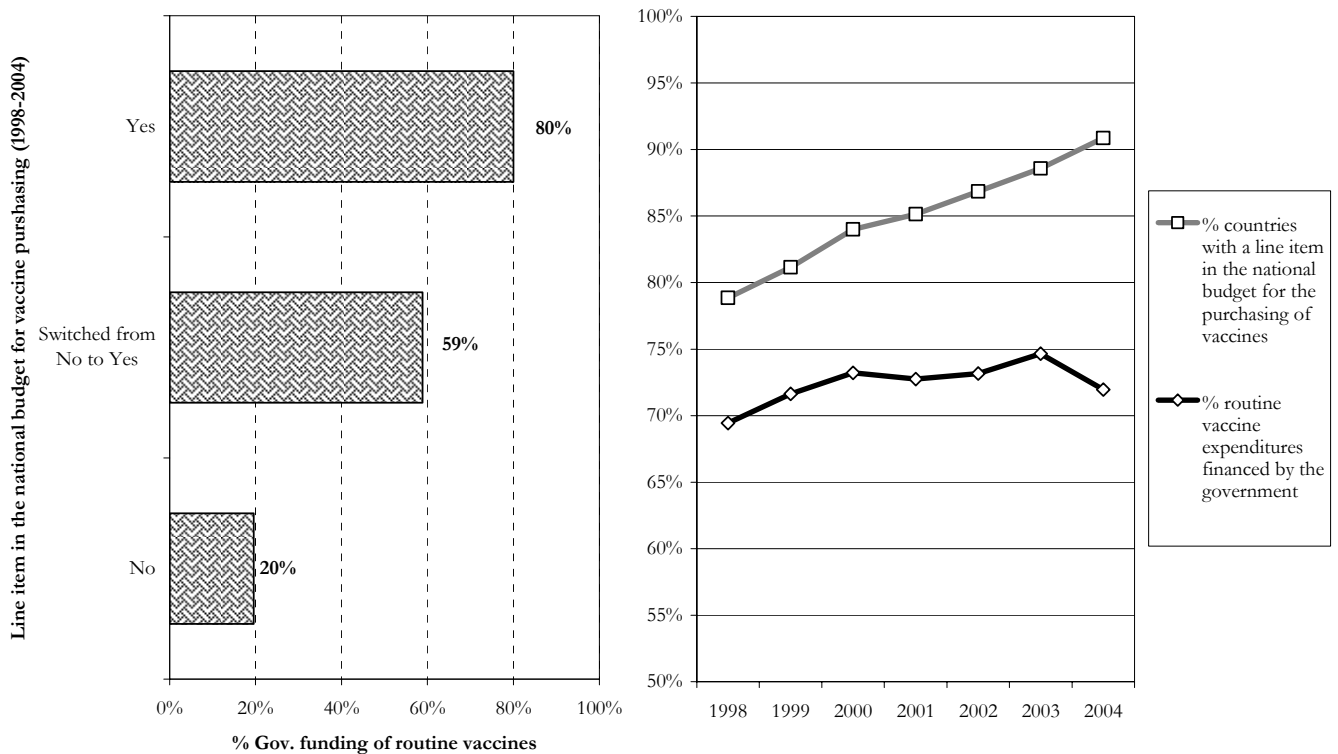
### 3. Relationship between Government Financing of Routine Vaccines and Existence of a Line Item in the National Budget for the Purchasing of Vaccines

Discussions about the value of a budget line item for vaccines have generated diverse views among immunization financing experts. Some believe that a line item is essential for long-term financial sustainability in respect of vaccines, while others believe it will have a neutral or only weakly positive effect. When we compare the trend in countries with a line item in the national budget for the purchasing of vaccines, and the corresponding share of vaccine funding by national governments, a positive relationship emerges.



Figure 3 highlights this relationship in two manners. First, we can see that government funding for vaccines is higher for those countries with a line item in the national budget than for those without. This relationship holds among low income countries and where the share of government funding for vaccines since 1998 is about 40% in the case of those countries with a budget line item, as compared to some 2% for low income countries without one.

Figure 3 - Relationship between line item in the national budget and government funding of vaccines



Secondly, the trend in the proportion of countries that included a line item in the national budget for the purchasing of vaccines and the corresponding trend in the share of government funding for vaccines shows a moderate correlation<sup>13, 14</sup>.

As described earlier, the creation of a line item has been a pre-requisite for a country to participate in the PAHO Revolving Fund, the UNICEF VII and the European Union ARIVA initiative, as a means of inducing greater national expenditures on vaccines, and ensuring that countries commit over time to raising the proportion of vaccine purchase costs that are paid through the national budget.

Comparing between countries that participate in either one of the three international mechanisms to facilitate vaccine financing with those that used alternative mechanism to procure vaccines, and within the same income grouping, revealed greater overall government funding for vaccines for the former. Overall, national expenditure for vaccines hover around 90% in countries that participate in the PAHO Revolving Fund which are mainly composed of middle income counties. The average is approximately 65% in countries participating in the UNICEF VII and the European Union ARIVA initiative which are mainly countries classified as low income and have a lesser ability to pay for vaccine expenditures using government funds. Yet, at least half of the countries participating in the latter two mechanisms reported in 2004 being entirely self sufficient in their vaccine financing.

<sup>13</sup> This trend does not include the countries that reported never having a line item in the national budget for the purchasing of vaccines for routine immunization. For this reason, the numbers are not comparable to those in table 3.

<sup>14</sup> The Pearson correlation coefficient between the two indicators is 0.65 which signals a moderate correlation.



## Limitations

Inferences from this analysis should be drawn only in light of the limitations. Three important ones are worth highlighting and are attributed principally to the vaccine financing indicator that measures the relative share of government funding for vaccines used in routine immunization.

A first obvious limitation concerns the quality of the data, our inability to assess it and the methods used to impute certain missing values. We can only infer that the quality of the information has improved over time in conjunction with the improved level of reporting completeness.

A second limitation has to do with the manner in which countries have interpreted what should be included in government funding. According to the JRF definition, countries should report only internal public funding for immunization, including the portion of development bank loans used for purchasing vaccines that would need to be reimbursed by the government. However, it is possible that countries may report transfers of bilateral donor agencies to the national treasuries (through pooled funds or budget support) for the purchasing of vaccines as internal public monies. This is of particular, and growing significance in countries receiving bilateral aid through a sector-wide approach (e.g. : SWAp countries) and national budget support (e.g. : EU support to ARIVA countries). If this is the case, countries would be over-reporting national government funds allocated to the purchasing of vaccines for routine immunization. However, if external budget support is being reported as government funding for vaccines, this limitation is consistent with the widely accepted definition of financial sustainability<sup>15</sup>.

Likewise, another area of ambiguity is a country's interpretation of what is considered a routine vaccine, given the difference in schedules across countries. For middle to high income countries that tend to be self-sufficient in their vaccine purchasing, this is of lesser importance. In low income countries, however, routine vaccines can either be interpreted as the traditional six antigens<sup>16</sup> of the expanded programme for immunization (EPI), or can include underused vaccines such as yellow fever, hepatitis B and *Haemophilus influenzae* type b. The level of government funding of vaccines will be higher or lower depending on how reporting countries are interpreting the term "routine vaccines". For the most part, it would appear that countries are reporting on the basic six antigens which would make the relative share of government funding higher.

A third and interrelated limitation is a certain inability to interpret annual trends, given that the indicator is a proportion and may change in relation to other proportions or the overall expenditures. For instance, a fall in the indicator does not necessarily imply a drop in value terms, nor does it a phenomenon of resource displacement away from immunization. Similarly, it is difficult to disentangle a real drop in government funding from a mechanical drop in the indicator if external support for vaccines increases. This can be the case for many low income countries that have been benefiting from GAVI supported vaccines since 2001.

The limitations cited above all point in the direction of over-reporting of government funding for vaccines. Thus, there is a good chance the reporting of this indicator is greater than the reality, and particularly for low income countries.

Finally, while the analysis showed a positive association, one cannot necessarily conclude that a budget line for the purchasing of vaccines causes an increase in the proportional share of government financing for vaccines. The causal link may be reversed. It may be that countries who were going to fund vaccines, established a line item in the national budget, but the line item itself did not drive the decision to fund vaccines.

## Conclusion

While the findings of this analysis are intended to be neither definitive nor exhaustive, and the numbers cited should be taken as indicative only, some important conclusions are worth underlining.

The analysis shows that the majority of WHO Member States have a line item in their national budget for the purchasing of vaccines and that an association between the creation of a national budget line item and greater national expenditures on vaccines is found. However, whether these benefits are realized or not, and whether creating a national

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<sup>15</sup> In June 2001, Global Alliance for Vaccines and Immunization (GAVI) embraced the following definition of financial sustainability: "Although self-sufficiency is the ultimate goal, in the nearer term sustainable financing is the ability of a country to mobilize and efficiently use domestic and supplementary external resources on a reliable basis to achieve current and future target levels of immunization performance in terms of access, utilization, quality, safety and equity". By doing so, GAVI is moving away from an earlier conceptualization that equated financial sustainability with self-sufficiency.

<sup>16</sup> Bacille Calmette-Guerin (BCG), diphtheria, tetanus and pertussis (DTP), polio and measles vaccine.



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budget line for vaccine purchasing can contribute to improved government financing, will depend on many other factors. Further analysis of this data is warranted to better understand the specifics of the relationship before any firm conclusions can be made.

An important final conclusion is that, despite the limitation of the data, the vaccine financing indicators collected through the WHO-UNICEF Joint Reporting mechanism have uncovered very useful strategic information, and that these indicators deserve continued monitoring. We have noted that reporting on these indicators has improved significantly over the past years and is a reflection of the efforts to strengthen this reporting mechanism as a comprehensive system to monitor immunization system programme performance in WHO Member States. The challenge in moving forward will be to continue improving the reporting and its quality.